

**PERFORMANCE AND STABILITY OF SCHEDULED
COMMERCIAL BANKS IN INDIA: AN EMPIRICAL
STUDY**

A Thesis Submitted

To

Sikkim University



In Partial Fulfillment of the Requirement for the
Degree of Doctor of Philosophy

By

J SOPAN

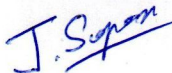
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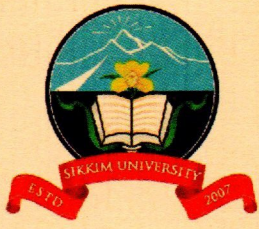


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All the assistance and help received during the course of investigation have been duly acknowledged by him.

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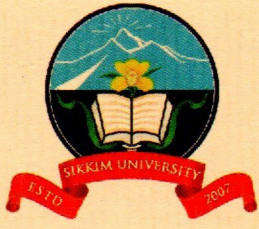
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<https://businessperspectives.org/journals/banks-and-bank-systems/issue-335/factors-affecting-the-liquidity-of-commercial-banks-in-india-a-longitudinal-analysis>
http://www.iibf.org.in/documents/LIQUIDITY_RISK.docx
https://www.researchgate.net/publication/260855178_THE_DETERMINANTS_OF_BANK_LIQUIDITY_DURING_FINANCIAL_CRISIS_A_COMPARATIVE_STUDY_OF_THE_GCC_BANKING_INDUSTRY
https://www.researchgate.net/publication/303765389_Determinants_of_banks'_profitability_-_The_case_of_Jordan
<https://www.sciencedirect.com/science/article/pii/S2212567115001045>
https://www.researchgate.net/publication/331865357_Credit_Risk_Determinants_Evidence_from_the_Bulgarian_Banking_System
https://www.researchgate.net/publication/286143663_Determinants_of_bank_profitability_Evidence_from_Jordan
https://www.researchgate.net/publication/282176833_The_determinants_of_bank_liquidity_Case_of_Tunisia
https://www.researchgate.net/publication/326091240_Factors_Affecting_Liquidity_of_Banks_Empirical_Evidence_from_the_Banking_Sector_of_Pakistan
https://www.researchgate.net/publication/329065315_Bank-Specific_and_Macro-Economic_determinants_of_profitability_of_Indian_commercial_banks_A_panel_data_approach
<https://core.ac.uk/download/pdf/234631382.pdf>
https://www.researchgate.net/publication/322340221_Bank_specific_industry_specific_and_macro_economic_determinants_of_profitability_of_public_sector_banks_in_India_2010-2016_a_panel_data_approach
https://www.researchgate.net/publication/258090738_The_Determinants_of_Non-Performing_Assets_in_Indian_Commercial_Bank_An_Econometric_Study

<https://core.ac.uk/download/pdf/236165011.pdf>

<https://www.researchgate.net/>

publication/335676212_Factors_Affecting_Bank_Profitability_in_Pakistan

<https://www.researchgate.net/>

publication/227670309_What_determines_the_profitability_of_banks_Evidence_from_Spain

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<http://ddms.usim.edu.my/bitstream/123456789/8548/7/Chapter%203-4090046.pdf>

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publication/336890680_Capital_Adequacy_of_Indian_Commercial_Banks_under_Basel_Regime_-
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<https://www.researchgate.net/>

publication/229053392_The_determinants_of_European_bank_profitability

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publication/228118418_Performance_and_Financial_Ratios_of_Commercial_Banks_in_Malaysia_
and_China

<https://www.researchgate.net/>

publication/247496091_Determinants_of_Bank_Profitability_in_a_Developing_Economy_Empiric
al_Evidence_from_the_China_Banking_Sector

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(J SOPAN)

Performance and Stability of Scheduled Commercial Banks in India: An Empirical Study

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LEGEND OF ABBREVIATIONS

AQR	Asset Quality Review
BIS	Bank for International Settlements
CAR	Capital Adequacy Ratio
COF	Cost of Funding
DEA	Data Envelopment Analysis
DTL	Deposits over Total Liabilities
FEM	Fixed Effects Model
FY	Financial Year
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
HHI	Herfindahl-Hirschman Index
INF	Inflation Rate
LDCG	Lagged effect of Credit Growth
LNPA	Lagged effect of Non-Performing Assets
LNTA	Natural Logarithm of Total Assets
MS	Market Share
NIM	Net Interest Margin
NPA	Non-Performing assets
NPATA	Net Non-Performing Assets over Total Assets
NPL	Non-Performing Loans
OLS	Ordinary Least Squares
OXPTA	Operating Expenses over Total Assets
PRSLTA	Priority Sector Lending over Total Advances
PSU	Public Sector Undertaking
RBI	Reserve Bank of India
REM	Random Effects Model
ROA	Return on Assets
ROE	Return on Equity
RRB	Regional Rural Bank
SBI	State bank of India
SCB	Scheduled Commercial Banks
SCP	Structure Conduct Performance Hypothesis
SDATA	Standard Restructured Assets over Total Advances
TE	Technical Efficiency
VAR	Vector Auto-Regression Model

Chapter - 1
Introduction

CHAPTER - 1

INTRODUCTION

1.1. OVERVIEW

A sound financial system is indispensable for a healthy and thriving economy. The banking sector constitutes a predominant component of the financial system of any economy and has always been deemed to be one of the most vital sectors for the economy to be able to function. As financial intermediaries, banks play a pivotal role as they transfer funds from surplus economic units to units which have investment opportunities but lack funds. In emerging economies where the capital markets are not yet developed, the role of banks becomes even more crucial.

Commercial banks in India, by forming a bridge between savers and investors help to fulfil the credit needs for productive activities, thus boosting economic growth. The Indian banking sector has witnessed structural changes and accelerated growth after the introduction of the second Narasimham Committee recommendations on reforms in 1998. There has been significant improvement in profitability, soundness, and stability of the Indian banks over the years. However, asset quality problems of the banking sector got accentuated in the financial year (FY) 2014, which took a toll on the overall health of the banking sector. The sluggish growth momentum of the economy, coupled with a higher level of non-performing and restructured assets, lower net interest margin, has hindered the profitability of Indian banks, especially the public sector undertaking (PSU) banks since 2014. Besides, a higher capital requirement under Basel III has also become a major concern for the Indian banks. The survival of the Indian banking industry under this tough regulatory regime depends on the strategies adopted

by various banks to improve their profitability and ensuring their stability. The changes in the performance and structure of banks can have far-reaching implications for the whole economy. In this backdrop, it is pertinent to examine the determinants of both performance and stability of the Indian banking sector in order to chart out future policies to improve its overall efficiency.

1.2. PERFORMANCE AND STABILITY OF BANKS IN INDIA

Globally, the performance and stability of banking institutions are measured through various financial indices as determined by the central bank of a particular country. In the case of India, the Reserve Bank of India (RBI), the country's central bank, had introduced the concept of stability mapping of the Indian banking sector using a VAR framework incorporating high-frequency data from the banking institutions (RBI, 2013). The banking stability mapping technique included Indicators, which represented an overall assessment of underlying conditions and inherent risk factors that impact the performance and stability of the banking sector. The stability Indicators are based on five indices which represent the five dimensions of:

- Soundness
- Asset-quality
- Profitability
- Liquidity
- Efficiency

A composite measure of each dimension can be calculated as a weighted average of a set of standardized ratios (represented in table 1.1) that are relevant in assessing the dimension. The ratios are largely drawn from those used by the Reserve Bank of India's supervisory department as part of its CAMELS assessment of banks.

The weights are also based on the weights assigned to the different ratios for the CAMELS rating. Each index, representing a single dimension of the functioning of the bank's, takes a value between zero (minimum) and 1 (maximum). The index represents a relative measure for the sample period used for its construction, with a higher value of the index indicating that the risks emanating to the banking sector from that dimension are higher. Therefore, an increase in the value of the index in any particular dimension indicates an increase in risk in that dimension for that period as compared to other periods.

Table 1.1: Performance and stability indicators and their measurement

Dimension	Ratios			
Soundness	CRAR	Tier_I Capital to Tier_II Capital	Leverage_ratio as Total-Assets to Capital and Reserves	
Asset-Quality	Net NPAs to Total- Advances	Gross NPAs to Total- Advances	Sub-Standard- advances to gross NPAs	Restructured- Standard- Advances to Standard- Advances
Profitability	Return on Assets	Net Interest Margin	Growth in Profit	
Liquidity	Liquid-Assets to Total- Assets	Customer- Deposits to Total- Assets	Non-Bank- Advances to Customer-Deposits	Deposits maturing within-1-year to Total Deposits
Efficiency	Cost to Income (Operating expenses to income – interest expenses)		Business (Credit + Deposits) to staff expenses	Staff Expenses to Total Expenses

Source: Reserve Bank of India (2013)

1.3. RATIONALE OF THE STUDY

Incorporating the five dimensions of banking performances and stability i.e., soundness, asset quality, profitability, liquidity, and efficiency, as defined by the Reserve bank (RBI, 2013), we proceed by formulating a framework of our own that

captures the effect of each of these dimensions and explain the variability in the performance and stability of banks operating in India.

This study intends to explore the various issues related to the efficiency of commercial banks in India and examine the factors at play that have a bearing on the level of their efficiency. This study would be particularly analyzing profitability, liquidity risk, and credit risk as proxies for assessing the performance and stability of Indian commercial banks. The study would weave together several distinct strands of performance and stability indicators of scheduled commercial banks in India and empirically examine their interplay as a case study. First, the study will look into the various factors that affect the performance by carefully studying the determinants of profitability. Subsequently, it will delve into the issue of Stability by examining the determinants. of liquidity risk and credit risk and ascertain to what extent does it curtail the operative capabilities of a bank which in turn may be the potential drivers of credit growth.

1.3.1. Profitability

Commercial banks, especially the public sector banks have been facing competition from the new private sector banks and foreign banks operating in India. There are many new market players domestic as well as international, coming into the banking sector. This has created the need for improving business efficiency and increasing the business volume of public sector banks (Bhattacharya *et al.*, 1997). It has been observed that although the banks are operating in the same economic environment yet the profitability of banks are at different levels.

To achieve substantial progress in the financial system of India, the banking sector must be efficient and should not continue to operate at low profitability. Thus, for boosting banking performance, a lot of initiatives were taken from time to time, such as, deregulation, equity share, and branch licenses, which were mostly based on the Narasimham Committee Report of 1991. The gradual relaxation of reserve ratios and several quantitative restrictions were implemented for improving bank profitability. The several changes that have taken place in the Indian banking system in terms of its operational autonomy and ownership, such as, collaborations, mergers and acquisitions, new banking services, and advances in information technology available to banks, are likely to enhance aggregate banking performance and thereby improve its profitability.

The performance and changes in profitability of a bank, regardless of its ownership are determined by two sets of variables: (a) the impact of market/industry-specific variable and (b) bank-specific variables (Athanasoglou *et al.*, 2008; Sanyal and Shankar, 2011). The present study seeks to incorporate all the above categories of variables for estimating the profitability of the Indian banking sector. The market/industry-specific variables include market concentration and market share. The bank-specific variables include bank size, asset quality, operating expenses, and net interest margin.

1.3.2. Credit risk

Banking in modern economies engages itself in risk management because the economic repercussions of a bank failure could be catastrophic on the entire financial system. Unsound risk management practices governing bank lending played a critical role in recent episodes of financial turmoil (Rahman *et al.*, 2004; Atikogullari, 2009). The

Basel Committee on Banking Supervision defines credit risk as the “potential default of a borrower to meet the obligation in accordance with the agreed term” (BIS, 2005). The Non-Performing Asset (NPA) otherwise known as Non-Performing Loans (NPL) is directly related to the financial performance of a bank and is the contributing factor to the credit risk of the banking system. An increase in the NPA of a bank suggests that there is a high probability of a large number of credit defaults. This in turn affects the net worth of the bank and also erodes the value of the bank’s asset. Historical evidence suggests that most bank failures are directly associated with poor management of credit risk (Levine *et al.*, 2000; Jimenez and Saurina, 2006). The problem of NPA not only affects the banks but also the whole economy. When loans and advances made by banks turn out as non-productive then they will become Non-Performing Assets. NPA is an asset or an account of a borrower that the bank classified as a substandard or doubtful asset.

The Indian banking sector has come a long way with regards to managing the NPA since the deregulation of the banking sector in the early 1990s. During the past two decades, the NPAs of the public sector banks have come down from 14 percent in the early 1990s to 3 percent in 2004. The private sector banks also have shown comparable progress in this regard. This is mainly attributed to the policies developed and implemented by the regulatory authority, the Reserve Bank of India (RBI) for the prudential management of NPA. However, due to the recent global economic meltdown and the recession in major economies, combined with low GDP growth rate and high inflation in the Indian economy the commercial banking sector in India has come under the grasp of high asset delinquency and is exposed to higher credit risk.

The present study seeks to explain the gradual surge in asset delinquency through determining the factors at large that affect credit risk. The study intends to empirically analyse macroeconomic and bank-specific factors with a special focus on exploring the effect of excessive credit growth in the past, through studying the impact of lagged credit growth on the overall credit risk of the Indian banking sector.

1.3.3. Liquidity risk

A balance sheet provides vital information regarding a bank's financial position at any given point in time. The asset side includes loans forwarded to borrowers while the liabilities side, among other things, shows deposits made by customers. Banks not only support the economy by providing finance but also assist in transactions carried out by an economic agent (Horváth and Weill, 2014). Further, banks play a crucial role in transforming illiquid assets into liquid assets through demand deposits (Diamond and Dybvig, 1983). However, an unexpected increase in liquidity demand forces banks to sell their illiquid assets at lower prices resulting in losses and increased risk (Allen and Gale, 2004; Allen and Santomero, 2001).

According to the guidelines of the Reserve Bank of India (2012), "liquidity is a bank's capacity to fund an increase in assets and meet both expected and unexpected cash and collateral obligations as they become due". Many researchers have emphasized that the fundamental role of banks as creators of liquidity makes them susceptible to liquidity risk (Ratnovski, 2013). Liquidity risk is the incapability of a bank to fulfil its financial commitments without losing assets or incurring undesirable expenditures. To avoid such a situation and maintain financial stability, it is preferable for banks to maintain a sufficient liquid buffer (Arif and Nauman Anees, 2012). After

the global financial turmoil, the low solvency of banks was assumed to be its root cause. The Basel Committee on Banking Supervision (2010) emphasized solvency of, and liquidity creation by banks, and proposed new capital rules to avoid such a situation in the future. These rules included maintaining higher capital reserves by banks. Liquidity risk had mostly been considered a secondary risk in banking literature before the global financial crisis. However, after the crisis, the attention of policymakers and researchers are drawn towards the grave effects of liquidity risk.

Although Indian banks have largely been able to adhere to the guidelines of the Reserve Bank of India for managing liquidity, factors affecting liquidity in Indian banks remain relatively unidentified owing to a scarcity of studies on the management of liquidity in Indian banks. The present study seeks to fill this gap by empirically analysing macroeconomic and bank-specific factors affecting the liquidity of Indian banks, thus making a significant contribution to the existing body of literature, and bringing high novelty value.

1.4. OBJECTIVES AND HYPOTHESES OF THE STUDY

In order to explain and analyse the various determinants that affect the variability in the profitability, credit risk, and liquidity risk of banks operating in India, which in turn determine their level of performance and stability, have set the following objectives for our study:

1. To analyse the determinants of profitability of Indian commercial banks
2. To analyse the effect of Competition and Market Concentration on Profitability
3. To analyse the determinants of Credit Risk in Indian commercial banks

4. To analyse the impact of excess credit growth in the preceding years on asset delinquency in Indian commercial banks
5. To analyse the determinants of liquidity Risk of Indian commercial banks
6. To analyse the trend of liquidity holding of the Indian banking sector

Further, we have set the following null hypotheses for our study and have grouped them into three categories i.e., profitability, liquidity risk, and credit risk, which we will test through our empirical models:

(a) Profitability

H₀₁ = There is no effect of Industry-Specific Variables on bank Profitability.

H₀₂ = There is no effect of Bank-Specific Variables on bank Profitability.

(b) Credit Risk

H₀₁ = There is no effect of Bank-Specific Variables on bank Credit Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Credit Risk.

(c) Liquidity Risk

H₀₁ = There is no effect of Bank-Specific Variables on bank Liquidity Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Liquidity Risk.

1.5. METHODOLOGY

In order to explain the variability in performance and stability of the banks operating in India, we will examine the various determinants that affect the profitability, credit risk, and liquidity risk of the Indian banks. While analysing the determinants of profitability of Indian banks we will study the market/industry-specific factors and the bank-specific factors that have an impact on the profit levels of Indian banks. Similarly, to examine the determinants of credit risk and liquidity risk, we will analyse the bank-specific and the macroeconomic factors that affect the credit risk and liquidity risk of the Indian banks.

To analyse the various determinants of profitability, credit risk, and liquidity risk of the Indian banks as mentioned above we will use a panel data regression model on a panel of 45 Indian banks comprising of all the public and private sector banks and these banks will be studied for a period of 10 years starting from FY 2005-05 till 2014-15. Further, a detailed description of the scope, objectives, hypotheses, period of study, data and sample size, and the empirical models to be used, is presented in the third chapter which pertains to the research design of our study.

1.6. CHAPTER SCHEME

Our chapter scheme starts with the introduction and which will be followed by the following chapters:

Chapter-2: Review of Literature. A survey of existing literature available on the Performance and Stability of the banking industry is carried out in this chapter. This chapter is divided into three subsections. Studies on the performance of banks have been reviewed in the subsection of Profitability while the review of studies on the stability of banks has been presented in the subsections Credit Risk and Liquidity Risk.

Chapter-3: Research Design. This chapter deals with the framing of the research design or the research methodology of our study. The research design is divided into seven parts i.e., the scope of the study, objectives of the study, period of the study, Data structure and sample size, sources of data, study hypotheses, and the empirical models to be used in the study.

Chapter-4: Determinants of Profitability. This chapter will give a background of the profitability of the Indian banking sector, an analysis of the of the market concentration and market share trend of the various bank groups, and will also examine the factors that affect the level of profitability in Indian banks by analysing the bank-specific and market/industry determinants that influence a bank's profit-earning capacity.

Chapter-5: Determinants of Credit Risk. This chapter will give a background of the credit risk of the Indian banking sector, an analysis of the of the credit growth and the asset delinquency rate trend of the various bank groups and will also examine the factors that affect the credit risk in Indian banks by analysing the bank-specific and macroeconomic determinants that influence a bank's asset delinquency rate.

Chapter-6: Determinants of Liquidity Risk. This chapter will give a background of the liquidity risk of the Indian banking sector, an analysis of the of the liquidity trend of the various bank groups, and will also examine the factors that affect the liquidity risk in Indian banks by analysing the bank-specific and macroeconomic determinants that influence a bank's holding of liquid assets.

Chapter-7: Conclusion. This chapter will deal with the summary of the whole thesis, the hypothesis results, the conclusion of the study along with the limitations of the study, and the contribution of the study. In this chapter, we also give the policy recommendations and the scope for further research.

1.7. CONCLUSION

In this chapter, we have discussed how we came across with the idea of this thesis and its importance. This chapter also focused on the rationale, objectives, hypothesis, a brief look into the methodology, and the chapter scheme. In the subsequent chapters, we will try to focus on every aspect of this thesis in detail. The next chapter deals with the review of literature based on previous research and studies pertaining to the performance and stability of banks.

REFERENCES

- Allen, F., & Gale, D. (2004). Financial fragility, liquidity, and asset prices. *Journal of the European Economic Association*, 2(6), 1015-1048
- Allen, F., & Santomero, A. M. (2001). What do financial intermediaries do?. *Journal of Banking & Finance*, 25(2), 271-294.
- Arif, A., & Nauman Anees, A. (2012). Liquidity risk and performance of banking system. *Journal of Financial Regulation and Compliance*, 20(2), 182-195.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, 18(2), 121-136.
- Atikogullari, M. (2009). An analysis of the Northern Cyprus banking sector in the post-2001 period through the CAMELS approach. *International Research Journal of Finance and Economics*, 32(10), 212-229.
- Bank for International Settlements (2005). Sound Credit Risk Assessment and Valuation for Loans. Retrieved from <https://www.bis.org/publ/bcbs126.pdf>
- Basle Committee on Banking Supervision. (2010). *Basel III: International framework for liquidity risk measurement, standards and monitoring*. Bank for International Settlements.
- Bhattacharyya, A., Lovell, C. K., & Sahay, P. (1997). The impact of liberalization on the productive efficiency of Indian commercial banks. *European Journal of operational research*, 98(2), 332-345.
- Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy*, 91(3), 401-419.
- Horváth, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research*, 45(3), 341-361. *International Journal of Central Banking* 2(2): 65-98.
- Jiminez.G. and J., Saurina, 2006. Credit cycles, credit risk and prudential regulation. *International Journal of Central Banking* 2(2): 65-98.
- Levine, R., N. Loayza, and T., Beck, 2000. Financial Intermediation and Growth: Causality and causes. *Journal of Monetary Economics* 46: 31 – 77.
- Ratnovski, L. (2013). Liquidity and transparency in bank risk management. *Journal of Financial Intermediation*, 22(3), 422-439.

RBI (2012). Liquidity Risk Management by Banks. *Monetary Policy Statement 2012-13 announced on April 17, 2012.*, Retrieved from <https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=7680>

RBI (2013). *Banking Stability - A Precursor to Financial Stability* (Working Paper No. 01). Mumbai: Rabi N. Mishra, S. Majumdar and Dimple Bhandia.

Sanyal, P., & Shankar, R. (2011). Ownership, competition, and bank productivity: An analysis of Indian banking in the post-reform period. *International Review of Economics & Finance*, 20(2), 225-247.

Chapter - 2
Review of Literature

CHAPTER - 2

REVIEW OF LITERATURE

2.1. INTRODUCTION

A survey of existing literature available on the Performance and Stability of the banking industry is carried out in the present chapter. Studies on the performance of banks have been reviewed in the subsection of Profitability while the review of studies on the stability of banks has been presented in the subsections Credit Risk and Liquidity Risk. As stated above, a topical segregation of literatures pertaining to the Performance and Stability of the banking sector in India is presented in a chronological manner.

2.2. PROFITABILITY

Athanasoglou et al. (2008) examined the effect of bank-specific, industry-specific, and macroeconomic determinants of bank profitability, which employed an empirical framework that incorporated the traditional Structure-Conduct-Performance hypothesis. To observe the persistence of profitability, they applied GMM technique to a panel of Greek banks spanning for a period of 1985-2001. Their estimation results showed that profitability persisted to a moderate extent, which indicated the departure from a perfectly competitive market structure. Their analysis found all bank-specific determinants, with the exception of size, affected bank profitability significantly. However, no evidence was found in support of the Structure-Conduct-Performance hypothesis. Finally, they observed that the business cycle had a positive but asymmetric effect on the profitability of banks, which is also significant only in the upper phase of the cycle

Kumar (2008) explored the relationship between Technical Efficiency and profitability in the Indian public sector banking industry using cross-sectional data for 27 banks. He used the technique of Data Envelopment Analysis to compute for each bank, Technical Efficiency scores for the year 2005. The mean score of Technical Efficiency for the Indian banking industry computed by him stood at being 88.5 percent implying that public sector banks could produce 1.13 times the output from the same inputs had they operated at the computed efficiency frontier. In his analysis of the 27 public sector banks, he found 20 banks to be inefficient and their technical inefficiency scores ranged from 2.6 percent to 36.8 percent. Moreover, he found that the banks affiliated with State Bank of India Group achieved better performance than the banks belonging to the Nationalized Banks Group in terms of operating efficiency.

Kaur (2010) attempted to rank on the basis of performance the various commercial banks operating in India by categorizing them into Public sector, Private sector and Foreign banks. For the purpose of analysing the profitability of banks she analysed 28 Public Sector, 28 Foreign banks and 26 Private Sector. For the purpose of ranking the banks on their performance, she used CAMEL analysis technique. She evaluated each evaluating attribute of CAMEL framework i.e., Capital Adequacy, Asset Quality, Management Quality, Earning Quality and Liquidity, by taking two ratios, and developed a final composite index.

Singh (2010) examined the impact of bank specific as well as macroeconomic variables on the performance of the banks operating in India. The results of his study revealed that among the macroeconomic variables, Gross Domestic Product of a country is of paramount importance in affecting the profitability of banks operating in

it and has a positive association. On the other hand, the quality of assets, as measured as the ratio of Net NPA over total Assets and management expenses measured by the ratio of Operating Expenses over Total Assets affects the performance of banks adversely. Moreover, the size of a bank measured by taking the natural logarithm of its Total Assets was found to be a significant bank profitability determinant. Lastly, he observed that the macroeconomic variables, had lesser effect on the foreign banks operating in India when compared to the domestic banks.

Kundid *et al.* (2011) in their study attempted to examine the determinants of profitability of banks operating in Croatia. They made use of a dynamic panel data model in their analysis. Their empirical analysis was conducted on a sample of 28 Croatian commercial banks over a period of seven years between 2003-2008. The sample of banks used by them in their empirical analysis represented more than 95 % of overall banking operation in Croatia. Return on assets was used as a proxy for bank in the analysis. The results of their study indicate that operating profits, wage expenses, net interest margin and quality of assets had an effect on the profitability levels of Croatian banks, while it was observed that the ownership structure and leverage ratio did not have any significant effect on bank profitability.

Arora (2014) measured technical efficiency of Indian banking sector by using a balanced panel of commercial banks operating in India using Data Envelopment Analysis with an objective of analysing the effects of financial reforms and ownership pattern on efficiency of Indian bank. Her analysis found evidence that financial reform, ownership pattern and listing of bank shares had an influence on efficiency of the bank operating in India. However, no conclusive evidence of a relationship

between size and efficiency was observed. In addition, it was found that the efficient banks were characterized by a higher Net Profit as a ratio of Total Assets and higher Profits per Employee, while the inefficient banks reported a higher level of Non-Performing Assets.

Osuagwu (2014) investigated the determinants of profitability in the bank operating in Nigeria. The study incorporated bank-specific variables, industry-specific factors and macroeconomic factors, using a panel of banks that accounted for more than 60% of total banking intermediation in Nigeria. Findings of the paper revealed that variation in profitability of Nigerian banks was largely explained by credit risk and other bank-specific determinants of profitability. Concentration in the market was found to be an important determinant of bank profitability. There is no evidence of structure-conduct-performance hypothesis, however empirical results show that there is no collusive behaviour amongst banks. Further, it was observed that the Exchange rate was a statistically significant determinant when return on equity and non-interest margin were taken as proxies for of bank profitability, but in the case of return on asset, used as a profitability measure it was found to be statistically not significant.

Căpraru and Ihnatov (2015) analysed the determinants of profitability of banks operating as a part of EU15 banking systems during the years of 2001-2011. They made use of three proxies to determine bank profitability, i.e., the return on average assets, net interest margin and the return on average equity. Their analysis showed, ratio of cost to Income, credit risk and concentration in the market had a negative effect in case of all measures of bank profitability. On the other hand, bank liquidity showed negative association only with ROE and net interest margin. Bank size had a

negative relationship with net interest margin, but, on the contrary, it had a direct association in case of return on average assets. The level of concentration in the market was found to have a negative influence, inferring that with increasing competition, the profitability of the banks also increases.

Seenaiyah *et al.* (2015) explored the factors that had an impact on the profitability of Indian banking sector in the post-reform era using panel data regression model on banking performance data from 1995 to 2012. The results of their study indicate that operating profits, wage expenses, net interest margin and non-performing assets had an effect on the profitability levels of Indian banks, while it was observed that the priority sector lending did not have any significant effect on bank profitability in India. Further, they found that the net interest margin had a negative association with bank profitability. Therefore, they suggested that the Indian banks should cut down on their operational expenses.

Alshatti (2016) investigated the critical factors that impacted the profitability of commercial banks operating in Jordan. His analysis used a balanced panel data regression model to assess the profitability determinants of these banks. For the purpose of his analysis, he incorporated the data relating to major bank-specific variables, of thirteen Jordanian banks, comprising of 130 observations spread over ten years between the years (2005-2014). He made use of two independent variable to explain the variability in bank profitability which include return on assets and the return on equity. The results of his empirical analysis indicated that the variables such as level of capital adequacy and leverage ratio positively impacted a bank's profitability. Further, it was found that the variable, quality of assets negatively

impacted the profitability of banks. Moreover, the empirical findings also reveal that the surge in profitability of Jordanian banks was associated with higher levels of capital adequacy maintained by them.

Barua *et al.* (2016) examined the influence of structural changes and conduct of the Indian banking sector on the profitability of Indian banks with the help of structure–conduct–performance framework. They had used annual bank-level data for the period 1999–2014 and the total number of banks in their panel data regression model comprised of 125 banks (Public Sector banks: 28, Private banks: 33 and foreign banks: 64). Concentration in the Market, banks-specific and macroeconomic variables were used by them as important determinants of bank profitability. Their regression results found a negative relationship between profitability and market concentration and rejected the structure–conduct–performance hypotheses. Their study found that bank capitalization, credit risk, level of leverage and ownership pattern were the most prominent determinants of the profitability in Indian banks. They could not find any significant impact of financial crisis on the profitability of Indian banks.

Rudhani *et al.* (2016) in their study investigated the impact of internal determinants on the commercial banks' profitability in Kosovo. They used the proxy of repayment of assets as a measure of profitability which is influenced by other independent variables, such as: size of the bank, level of capital adequacy, liquidity and credit risk. Their empirical analysis was based on commercial banks' data operating in Kosovo during the period 2010-2014. The findings of their study revealed that commercial banks operating in Kosovo had the ability to increase their profitability level by increasing the amount of bank credit and other investments, except for managing the risk of liquidity shortage efficiently.

Kawshala and Panditharathna (2017) examined the impact of bank specific factors of profitability of domestic commercial banks operating in Sri Lanka. Their study was conducted with the help of balanced panel data and utilized the sample of data from annual reports of the banks in Sri Lanka. Their analysis comprised of 60 observations derived from 12 Sri Lankan domestic commercial banks observed over a period five years between 2011-2015. The regressors used in their study comprised of Bank size, level of Capital adequacy, Deposits to Assets ratio, and Liquidity risk, while they used Return on assets as the proxy for profitability. The results of their study indicate that operating profits, wage expenses, net interest margin and non-performing assets had an effect on the profitability levels of Sri Lankan banks, while it was observed that the ratio of deposits over total assets did not have any significant effect on bank profitability. Further, they found that the net interest margin had a negative association with bank profitability.

Almaqtari et al. (2018) in their study examined the determinants of profitability of Indian commercial banks and their analysis was conducted over a period of 10 years between the period 2008 to 2017. Their study used a balanced panel data over a of 69 commercial Indian banks. They used by two proxies to assess the Profitability of Indian banks, namely return on assets and return on equity. The regressors used in their analysis include bank size, assets quality, level of capital adequacy, liquidity risk, operating efficiency, ratio of deposits over total assets, leverage ratio, assets under management, and the number of banks' branches which formed the part of internal factors that influence bank profitability. Further, they used a set of external or macroeconomic factors such as gross domestic product, rate of inflation, rate of interest, exchange rate, year dummy variables for financial crisis, and demonetization.

The results of their study revealed that bank size, the number of branches, assets management ratio, operational efficiency, and leverage ratio are the most important bank-specific determinants that affect the profitability of Indian commercial banks as measured by return on assets. Furthermore, among the internal factors, the results of their analysis revealed that size of the bank, assets under management, quality of assets, and liquidity risk ratio were found to have a significant positive impact on return on equity. With regard to the external factors, their results showed that the rate of inflation, exchange rate, the rate of interest, and demonization had a significant effect on return on assets. However, in the case of return on equity as the dependant variable, the empirical results show that all external factors except for demonization had a significant impact on the bank's profitability.

Garcia and Trindade (2019) analysed the factors that influence the profitability of the banks operating in Angola. They analysed 17 banks over a period of seven years between 2010 and 2016. Their paper conducted a dynamic panel data regression analysis, using two proxies to measure Profitability i.e., the return on average assets and the return on average equity. The also incorporated several control variables which included both internal and external determinants of bank profitability such as bank size, ownership pattern operating expenses ratio, liquidity risk, asset quality, rate of inflation and growth of gross domestic product. Their study concluded conclude that several independent variables had an impact which diverged from their priori expectation, especially the variable ownership pattern, which revealed a positive association with bank profitability and was statistically significant.

2.3. CREDIT RISK

Ahmad and Ariff (2008) in their paper attempted to explore key determinants of credit risk of banking systems in emerging economies and compared them with the ones of developed economies. In their study, developed economies were represented by Australia, France, Japan and the US while the emerging economies included Malaysia, Mexico, India, Korea, and Thailand. They employed multi country panel data regression models to arrive at their findings which revealed that Regulatory capital or the requirement of capital adequacy levels mandated by the BASEL norms had a significant role in determining the credit risk of banks in both developed and emerging economies. Further, quality of management was found to be crucial in the cases of loan-dominant banks in the case of emerging economies. Moreover, they observed that the leverage ratio had no correlation with credit risk of banks as opposed to popular theories.

Misra and Dhal (2010) provided an analysis of factors that influenced the credit risk determinants of commercial bank operating in India. They used a sample of 26 public sector banks in India and analysed them with the help of a panel data regression model. Their analysis spanned for a period of 14 years, between 1996 to 2009 which aimed to study the impact of financial reforms on the functioning of Indian banks. They incorporated three group of variables to determine the credit risk of Indian banks, namely bank-specific indicators, terms of credit policy and the impact of regulatory policies on capital requirement. The results of their empirical model revealed that the terms of credit variables such as rate of interest, maturity horizon and loan collaterals impacted the credit risk of banks. Further, they also found a significant effect of the bank-specific variables on the asset quality of Indian banks.

Moreover, they observed that the credit culture being represented by the terms of credit policy variables had a significant role in managing the impact of business cycles on the credit risk of banks.

Thiagarajan *et al.* (2011) examined the determinants of the credit risk in commercial banks operating in India. Their study was conducted on a sample of 22 public sector banks and 15 private sector banks operating in India, which were analysed for a period of 10 years between 2001 to 2010. They made use of a panel data regression analysis to determine the credit risk in Indian banks. The results of their empirical analysis revealed that the both macroeconomic and bank specific factors had a significant role in affecting the credit risk of the Indian banking sector. They observed that accumulated bad loans from the previous years had a strong and statistically significant positive impact on the level of current year's non-performing loans. Further, they also found a significant but negative association between the prevailing economic cycle captured by growth of GDP and the credit risk for both public and private sector banks in India.

Louzis *et al.* (2012) analysed the factors that affected the quality of assets, thereby impacting the credit risk of banks operating in Greece. They made use of a dynamic panel data model to analyse the determinants of bank credit risk in Greek banks for each loan category separately i.e., consumer loans, business loans and mortgages. For their analysis they incorporated both macroeconomic and bank-specific variables that had an effect on the quality of assets and under the assumption that the effect of these variables vary for different loan categories. The findings of their analysis revealed that macroeconomic variables such as growth of GDP, unemployment, prevailing rate

of interest, public debt had an impact on the credit risk of Greek banks. Moreover, among the bank-specific variables management quality was found to be a significantly affect bank credit risk. Their study highlighted the differences in the quantitative effect of macroeconomic determinants among the different loan categories, with the quality of assets being the least responsive to variations in the macroeconomic conditions.

Messai and Jouini (2013) in their study attempted to examine the determinants of non-performing loans in three eurozone countries i.e., Italy, Greece and Spain as these three countries were the worst affected by the subprime crisis of 2008. Their analysis incorporated a sample of 85 banks operating in these three countries and were studied for a period of 5 years between 2004 to 2008. Their study used both macroeconomic variables and bank-specific variables to analyse the credit risk determinants. The macroeconomic determinants included the growth rate of GDP, rate of unemployment and real interest rate. The bank-specific variables used by them comprised of bank profitability, credit growth and the loan loss reserve ratio. The results of their empirical model found that among the macroeconomic variables the growth rate of GDP and among the bank-specific variables profitability were found to have a negative relation with the credit risk of banks. The rate of unemployment, the level of loan loss reserves and the real interest rate positively impacted the credit risk of three eurozone banks.

Abid et al. (2014) examined the determinants of retail non-performing loans arising in the banks operating in Tunisia. Their study analysed the non-performing loans on a sample of 16 of Tunisian banks using a Dynamic panel data model which studied the

bank data for 10 years between the period 2003 to 2012. Their primary objective of their study was to examine the potential impact of both macroeconomic and bank-specific factors on the quality of assets thereby affecting the credit risk of bank in Tunisia. Their results of their analysis indicate that the macroeconomic factors that had an impact on the level of retail non-performing loans in the Tunisian banks were growth rate of gross domestic product, rate of inflation and the prevailing policy interest rates, while bad management policy was the only bank-specific factor which significantly influenced the asset delinquency rate among the Tunisian banks.

Makri *et al.* (2014) identified the factors that affected the asset delinquency rate of the banks operating in the Eurozone area. Their study was conducted on a sample of banks belong to 14 eurozone countries consisting of 120 observations. Their study analysed the sample of banks for a period of 9 years between 2000 to 2008. Their analysis incorporated both macroeconomic variables and bank-specific variables. The macroeconomic variables included annual percentage growth rate of gross domestic product, public debt as percentage of gross domestic product and unemployment, while the bank-specific variables comprised of loans to deposits ratio, return on assets, return on equity. The results of their empirical model revealed a strong association between asset delinquency and various macroeconomic factors such as public debt, unemployment and the growth rate of gross domestic product. Similarly, the bank-specific factors such as level of capital adequacy, lagged effect of nonperforming loans of the previous year and bank profitability also significantly affected the rate of asset delinquency.

Nikolaidou and Vogiazas (2014) examined the factors that influence the credit risk of banks operating in Bulgaria. In their analysis they used an autoregressive distributed lag model on the credit risk determinants of the Bulgarian banking system and studied them for a period of 10 years between 2001 to 2010, which captured the effect of the time period between the privatization of Bulgarian banks and the global financial crisis. The findings of their imperial analysis suggested that the credit risk determinants of Bulgarian banks were impacted by both the macroeconomic and industry-specific variables. They observed that the global financial crisis and regulatory framework of the Bulgarian central bank had a significant influence on the credit policy of bank. They also observed that Bulgarian banking system was unaffected by the Greek debt crisis which had adverse effect on the bank credit risk of the other south east European countries.

Bardhan and Mukherjee (2016) examined the determinants of asset delinquency in commercial banks operating in India. In their study they used a dynamic panel data regression models incorporating several variants of GMM techniques. The period of their study spanned for 18 years between 1995 to 2011, which captured the impact of liberalization in the Indian banking sector. For the independent variables, they used both bank-specific as well as macroeconomic factors that had an influence on the quality of assets of Indian banks. The results of their analysis revealed that size of the banks affected their sate of solvency, meaning that the larger banks were at higher risk of default than their smaller counterparts. Further, they also found evidence to support the bad management hypothesis, with their observation that the profit level of the banks was inversely associated with the level of bad loans in Indian banks.

Finally, they observed that lagged effect of capital adequacy had a significant impact in reducing the level of current year's bad loans in Indian banks.

Samantaraya (2016) explored the factors that had an effect on the increasing trend of Non-performing loans in the banks operating in India. His study analysed a sample of 50 commercial banks with the help of a panel data regression model. The banks were studied for a period of 10 years between 2003 to 2014, comprising of 550 bank year observations used to estimate the model. On the basis of the empirical finding, he observed that excessive credit growth in the preceding years was a major factor that has led to current year's surge in non-performing loans. While the other factors such as prevailing economic cycle, level of capital adequacy and overall management efficiency of the banks also impacted the incidence of nonperforming loans. In order to strengthen financial stability and enhancing the effectiveness of monetary policy, he suggested macro-prudential measures such as counter-cyclical capital buffer and dynamic provisioning must be practiced by the Indian banks.

Morina (2020) in their paper analyzed the determinants of credit risk among the commercial banks operating in Kosovo by using a panel data regression analysis for a period of 7 years from 2012 till 2018. In their empirical model they used the ratio of non-performing loans over total advances as the credit risk measure. The regressors used to analyse the determinants of credit risk in Kosovo include bank size, profitability of a bank, interest earned on loans as the bank-specific factors whereas the rate of inflation and the rate of growth of the gross domestic product formed the macroeconomic determinants. After analyzing the necessary data, they concluded that, among the credit risk determinants, profitability of banks and the

interest rates on loans had the most significant and largest impact on credit risk of banks.

2.4. LIQUIDITY RISK

Vadova (2011) in her paper examined the determinants of liquidity risk of Czech commercial banks. The study was conducted for a period of 9 years from 2001 to 2009 comprising a sample of banks which accounted for more than 85 percent of the total banking assets in the Czech Republic. The empirical results of the panel data regression analysis employed by her revealed that there was a positive relationship between bank liquidity risk and the level of capital adequacy. Similarly, the proportion of non-performing loans and the rate of interest on loans and also had a positive effect on bank liquidity. Further the variables that was found to have a negative impact include rate of inflation, financial crisis and business cycle. However, the empirical findings could not define the relation between the size of banks and its impact on their liquidity.

Munteanu (2012) identified the factors that influenced the liquidity risk of commercial banks operating in Romania. He analysed the factors through a multiple regression model, over a panel of 27 Romanian banks over a period of 8 years between 2002 and 2010 with a specific emphasis of studying the pre financial crisis years and the crisis years separately i.e., 2002-2007 and 2008-2010 respectively. He observed that the results reflected different outcomes for the determinants used to determine the two liquidity rates i.e., the ratio of Net Loans over Total Assets and the ratio of Liquid Assets over Deposits and short-term funding. It was observed that an

important parameter of banking stability i.e., Z-score used as a proxy for bankruptcy, had a significant effect on the liquidity risk of banks during the crisis years.

Parameswar *et al.* (2012) undertook an analysis to determine the factors that affected the liquidity of banks operating in the Gulf Cooperation Council nations. Their analysis majorly focused on liquidity status of banks during and around the financial crises of 2008. They analyzed a total of 67 banks from the GCC nations for a period of 10 years between 2000 to 2009, with an emphasis on the bear-phase beginning from the year 2006. The major finding from their panel data analysis revealed that that key financial ratios such as capital, liquidity and profitability ratios in the pre-financial crisis or bear period had a bearing on how banks performed during the crisis period. These strong ratios during the pre-bear phase led to higher liquidity creation during the bear phase.

Choon *et al.* (2013) identified the factors significant in explaining liquidity risk of Malaysia commercial Banks. Their study had classified the explanatory variables into bank-specific determinants and macroeconomic determinants. The bank specific determinants comprised of size of the bank, level of Capital Adequacy maintained by the bank, Profitability, quality of assets held by the bank, while the macroeconomic determinants comprised of growth rate of gross domestic product, interest rate on inter-bank transactions and the effect of financial Crises. Their study was conducted on a sample of 15 Malaysia commercial banks for the period of 10 years between 2003 to 2012. Most of the variables used in their empirical model were either expressed in terms of ratios or in percentage while the dummy variable was qualitative in form. All the variables used in their analysis of bank liquidity of

Malaysian banks were found to be statistically significant except for the rate of interest on inter-bank transactions. The determinants which revealed a positive association with bank liquidity were the quality of assets represented by the amount of bad loans held by a bank, profitability level of the banks and the growth rate of gross domestic product. On the other hand, size of the bank, capital adequacy level and the effect of financial crisis were found to have a negative effect on bank liquidity.

Cucinelli (2013) analysed the factors that affected the liquidity risk of banks operating in the Euro zone area. He made use of bank-specific determinants such as bank size, level of capitalization, quality of assets and specialization to explain the variation in bank liquidity. The proxies used in his analysis to measure bank liquidity comprise of the liquidity coverage ratio and the net stable funding ratio. The sample of banks comprised of 1080 listed and non-listed banks operating in the Euro zone area, which were empirically examined through an OLS regression model based on a panel data framework. The results from his analysis revealed that as the size of a bank increases with respect to its total assets, its exposure also increases to higher liquidity risk. On the other hand, he observed that the banks which maintained a higher level of capitalisation did better at managing their liquidity in the long term. The finding also revealed that bank liquidity measured in terms of short-term liquidity risk was affected by the quality of assets held by them, while the banks that specialized only in the lending activities were the most affected by the variation in their liquidity holding. Finally, it was observed from his analysis that during the financial crisis, liquidity management measures adopted by the banks in Euro zone changed only for a short-term.

Vadova (2013) in her paper examined the determinants of liquidity risk of commercial banks operating in Hungary. The study was conducted for a period of 10 years from 2001 to 2010 comprising a sample of banks which accounted for more than 70 percent of the total banking intermediation in the Hungarian banking sector. The bank-specific factors incorporated in her analysis include size of the banks, quality of assets, profitability and the level of capitalization whereas the external factors comprise of inflation rate, growth rate of GDP, unemployment rate and the rate of interest. The results of her panel data analysis revealed that that a bank's liquidity had a positive relation with the level of capital adequacy maintained by the banks. Similarly, the rate of interest on loans and bank profitability also positively affected bank liquidity. It was observed from the findings of her study that the size of the bank, net interest margin, the policy interest rate and interest rate on interbank transaction had a negative association with the level of liquid assets maintained by a bank. Further, no clear relationship could be determined between the growth rate of gross domestic product and bank liquidity.

Delechat *et al.* (2014) examined the determinants of liquidity risk of commercial banks operating in Central America, Panama and the Dominican Republic. To analyse the determinants of bank liquidity, they used a panel of 96 banks, which were studied for a period of 5 years between 2006 to 2010. In their study they found evidences of bank liquidity risk being associated with the bank-specific factors such as size of the bank, bank profitability, level of capital adequacy, and financial development. They also observed that promoting deposit dollarization and reinforcing the monetary

policy was associated with higher levels of bank liquidity. Their study is among only a handful of studies that investigated the association between degrees of dollarization and its effect on bank liquidity risk. The findings of their analysis revealed that improving supervision and implementing measures to promote dollarization which includes strengthen local currency capital markets promoted the health of financial systems and helped better intermediation in the region.

Moussa (2015) analysed the factors that determine the liquidity risk of the banks operating in Tunisia. For this purpose, he used a sample of 18 banks operating in Tunisia and analysed them for a period of 11 years, between 2000 to 2010. In his estimation model he made use of two measures of liquidity i.e., the ratio of liquid assets over total assets and the ratio of total loans over total deposits. His study used both the estimates of static and dynamic panel data regression models. The results of the empirical estimates revealed that financial performance, capital to assets ratio, operating efficiency, economic cycles, the rate of inflation and lagged liquidity had significant effect on the liquidity risk banks, while the size of the bank, loans to assets ratio, the ratio of financial costs over total advances and the rate of deposits did not have a significant effect on liquidity risk of banks.

Sudirman (2015) in his paper attempted to determine the liquidity risk of banks operating in Indonesia during the global monetary crisis period of 2008. In his study he analysed 20 banks chosen on the basis of purposive sampling method incorporating a dynamic panel analysis. The results from his analysis reveal that there were some variables such as asset quality, profitability, capital adequacy, cost of funding, interest rate and inflation, which were statistically significant and helped to determine the

liquidity risk of banks in Indonesia. The variables profitability, Asset quality and the rate of inflation had a positive effect on bank liquidity while capital adequacy, cost of funding and the rate of interest had a negative association.

Singh and Sharma (2016) investigated bank-specific and macroeconomic factors that had an influence on the liquidity risk of Indian banks. In order to explore this relationship, they performed pooled OLS, panel least square and random effect panel data regression analysis on a data set of 59 banks operating in Indian between the period 2000 to 2013. The bank-specific factors, which they used in their study include size of the bank, bank profitability, funding cost, the level of capital adequacy maintained by the bank and the ratio of deposits to total liabilities. The macroeconomic factors incorporated by them include growth rate of GDP, rate of inflation and the rate of unemployment. They also performed liquidity trend analysis of liquidity holdings maintained by the Indian banks on basis of their ownership. The results obtained from their liquidity trend analysis revealed that the ownership of banks affected their liquidity holdings. While the results obtained from their empirical analysis using a panel data regression analysis, revealed that all the bank-specific determinants except for the funding cost and macroeconomic determinants except for the rate of unemployment significantly affected the liquidity holdings of bank operating in India. The bank-specific factors, which were found to be statistically significant were the size of the bank, bank profitability, the level of capital adequacy maintained by the bank and the ratio of deposits to total liabilities, while growth rate of GDP and the rate of inflation were the statistically significant macroeconomic determinants. Further, the size of the bank and growth rate of GDP were found to have a negative association with bank liquidity. Lastly, the ratio of deposits to total

liabilities, bank profitability, level of capital adequacy and the rate of inflation revealed a positive relationship with bank liquidity.

Sopan and Dutta (2018) in their present paper explored the determinants of liquidity risk in Indian banks by examining the bank specific and macroeconomic factors that affect a bank's liquidity holdings. The bank specific determinants analysed in their study include bank-size, deposit rate, profitability, asset quality, funding cost and the rate of capitalization in a bank. While the growth rate of Gross Domestic Product (GDP) and the inflation rate constitute the macroeconomic determinants. To analyse the effect of these determinants on bank liquidity, in their study they employed a panel data analysis on 45 Indian banks comprising of State Bank of India (SBI) group banks, Nationalized banks and Private banks observed over a period of 12 years from Financial Year (FY) 2005 to 2016. The findings of their empirical analysis revealed that among bank-specific determinants, the size, profitability level, funding cost and the quality of assets negatively influenced the liquidity risk of Indian banks. Whereas the rate of deposits and the capitalization rate had a positive effect. Amongst the macroeconomic determinants inflation rate and GDP growth rate was found to have a positive and negative association with bank liquidity respectively.

Al-Homaidi *et al.* (2019) examined the liquidity risk determinants of listed commercial banks operating in India. Their study was conducted on a panel of 37 commercial banks listed on the Bombay Stock Exchange and was analysed for a period of 10 years between 2008 to 2017. They used both bank-specific and macroeconomic variables in their analysis to determine bank liquidity. To analyse the variables, they used both GMM and pooled, fixed and random effect panel data models. The results obtained from their empirical analysis indicated that among the

bank-specific factors, size of the bank, level of capital adequacy, ratio of deposits to total liabilities, operation efficiency ratio, and bank profitability were found to have a statistically significant and positive effect on the liquidity of banks, while the quality of assets, management efficiency and the performance measures such as return on equity, and net interest margin were found to have statistically significant but a negative effect on the liquidity of banks. Lastly, among the macroeconomic variables, the results revealed that the prevailing rate of interest and exchange rate are found to have a significant impact on the liquidity of banks.

Bhati et al. (2019) attempted to examine the impact of various regulatory, bank-specific and macroeconomic determinants on the level of liquidity holdings of the banks operating in India. In their study, they used a random effect panel data regression model for the estimation of bank liquidity. Their analysis was conducted on a panel of all the Indian banks which were studied for a period of 21 years, between 1996 to 2016. Their study specifically analysed the effects of regulatory determinants of bank liquidity such as cash reserve ratio and statutory liquidity ratio. Further, they incorporated four different proxies of bank liquidity, specific to the Indian banking scenario such as the ratio of liquid assets to total assets, ratio of liquid assets to liabilities, ratio of loans to total assets and the ratio of loans to deposits plus short-term borrowings and bills payable. The results of their analysis revealed that the banks in India relied more on asset-based liquidity and less on liability-based liquidity. The asset-based liquidity ratios which include the ratio of liquid assets to total assets revealed a significant relationship with the macroeconomic determinants of bank liquidity such as discount rates, call rates, foreign exchange reserve, exchange rate, rate of inflation and the growth rate of gross domestic product. It also had an

impact on the bank-specific determinants such as capital to total assets and bank size. Lastly the regulatory factors of cash reserve ratio and bank profitability and the quality of assets found to have no effect on liquidity risk of Indian banks.

Muchtar and Rustimulya (2019) attempted to determine the factors that affected the liquidity risk of commercial bank operating in Indonesia and were listed on the Indonesia Stock Exchange. Their study was conducted in a panel data framework comprising a sample of 25 banks which were studied for a period of 10 years, between 2008 to 2017. They made use of both bank-specific or internal factors and the macroeconomic or external factors in their analysis. The internal factors include bank size, rate of deposits, bank profitability, funding cost, quality of assets and the level of capital adequacy, while the external factors comprise of economic cycle represented by the growth rate of the gross domestic product and the rate of inflation. The result of their empirical model revealed that that the size of the bank, bank profitability, funding cost, and asset quality had a negative effect on bank liquidity risk, while the rate of deposits, the level of capital adequacy, economic cycle, and inflation did not have statistically significant effect on bank liquidity risk.

Wanamali (2020) investigated the factors that affected the liquidity risk of commercial banks operating in Sri Lanka. In her study he used a sample of eleven Sri Lankan commercial banks and analysed these banks for a period of 11 years between 2008 to 2018. To determine the factors affecting bank liquidity she used both bank-specific and macro-economic factors as independent variables. For the dependent variable she made use of three proxies for bank liquidity and analysed the independent variables against each proxies of bank liquidity. The proxies include,

ratio of the liquid assets over total assets, ratio of total loans over total deposits and the number of short-term borrowings. She tested these variables using a fixed effects panel data regression model. Among the bank-specific variables, capital adequacy ratio had a negative and a statistically significant association with bank liquidity, while profitability and the cost of funding was found to have a positive and statistically significant association. Her analysis also revealed that the size of a bank negatively affected its liquidity. Further, she incorporated a comparative analysis to check the effect of total deposits ratio and fixed deposits ratio on the liquidity risk of banks and she found that an increase in both the ratios decreases bank liquidity. Moreover, she found that the quality of assets measured by impaired loans did not have any effect on bank liquidity. With respect to the macro-economic variables, she observed that the liquidity of banks had a negative association with the growth rate of gross domestic product and the inflation rate, whereas it is positively related with the rate of unemployment.

2.5. RESEARCH GAP

It is observed that only a handful of studies were conducted in the context of determining the factors that affect the liquidity risk of banks. Of these studies, most were conducted in foreign markets, particularly in the European Union. The studies which determined liquidity risk factors in Indian banks were not extensive and only included a small sample of banks. Similarly, in the case of credit risk and profitability most of the studies were either carried out in advanced economies or are far between. The studies pertaining to determinants of profitability in banks have often used CAMEL approach and Data Envelopment Analysis (DEA) technique to ascertain the technical efficiency of banks. Although a few studies in Indian context on profitability

determination have employed multiple regression models, they lack a holistic approach as none of them have incorporated all industry-specific, bank-specific and relevant macroeconomic variables to explain the variation in profitability of Indian banking sector. In this backdrop estimating all the three attributes of bank performance and stability for a same period of time through a panel data framework will be a novel approach.

2.6. CONCLUSION

In this chapter we conducted a thorough review of the extant literature available in the context of performance and stability of banks, which were then classified into three sub themes consisting of bank profitability, bank credit risk and the liquidity risk of banks. We also highlighted the gaps in the extant literature pertaining to performance and stability of banks in the Indian context, which in turn will serve as the basis of laying out the research design of the study covered in the next chapter.

REFERENCES

- Abid, L., Ouertani, M. N., & Zouari-Ghorbel, S. (2014). Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*, 13, 58-68.
- Ahmad, N. H., & Ariff, M. (2008). Multi-country study of bank credit risk determinants. *International Journal of banking and Finance*, 5(1), 135-152.
- Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2019). The determinants of liquidity of Indian listed commercial banks: A panel data approach. *Cogent Economics & Finance*, 7(1), 1616521.
- Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2019). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics*, 24(1), 168-185.
- Alshatti, A. S. (2016). Determinants of banks' profitability—the case of Jordan. *Investment Management & Financial Innovations*, 13(1), 84.
- Arora, P. (2014). Reforms, ownership and determinants of efficiency: An empirical study of commercial banks in India. *Journal of Emerging Market Finance*, 13(1), 103-138.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, 18(2), 121-136.
- Bardhan, S., & Mukherjee, V. (2016). Bank-specific determinants of nonperforming assets of Indian banks. *International Economics and Economic Policy*, 13(3), 483-498.
- Barua, R., Roy, M., & Raychaudhuri, A. (2016). Structure, conduct and performance analysis of Indian Commercial Banks. *South Asian Journal of Macroeconomics and Public Finance*, 5(2), 157-185.
- Bhati, S., De Zoysa, A., & Jitaree, W. (2019). Factors affecting the liquidity of commercial banks in India: a longitudinal analysis. *Banks and Bank Systems*, 14(4), 78.
- Căpraru, B., & Ilnatov, I. (2015). Determinants of bank's profitability in EU15. *Annals of the Alexandru Ioan Cuza University-Economics*, 62(1), 93-101.

- Choon, L. K., Hooi, L. Y., Murthi, L., Yi, T. S., & Shven, T. Y. (2013). *The determinants influencing liquidity of Malaysia commercial banks, and its implication for relevant bodies: evidence from 15 Malaysian commercial banks* (Honours Unpublished Thesis). Universiti Tunku Abdul Rahman, Kampar.
- Cucinelli, D. (2013). The determinants of bank liquidity risk within the context of euro area. *Interdisciplinary Journal of Research in Business*, 2(10), 51-64.
- Deléchat, C., Henao, C., Muthoora, P. and Vtyurina, S. (2014). The Determinants of Banks' Liquidity Buffers in Central America. *Monetoria, II* (1), 83-129.
- Garcia, M. T. M., & Trindade, M. J. (2019). Determinants of banks' profitability in Angola. *African Journal of Economic and Management Studies*.
- Kaur, H. V. (2010). Analysis of banks in India—A CAMEL approach. *Global Business Review*, 11(2), 257-280.
- Kawshala, H., & Panditharathna. K. (2017). The Factors Effecting on Bank Profitability. *International Journal of Scientific and Research Publications*, 7(2), 212-216.
- Kumar, S. (2008). An analysis of efficiency–profitability relationship in Indian public sector banks. *Global Business Review*, 9(1), 115-129.
- Kundid, A., Škrabić, B., & Ercegovac, R. (2011). Determinants of bank profitability in Croatia. *Croatian Operational Research Review*, 2(1), 168-182.
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, 36(4), 1012- 1027.
- Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, 61(2), 193-206.
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International journal of economics and financial issues*, 3(4), 852-860.
- Misra, B. M., & Dhal, S. (2010). Pro-cyclical management of banks' non-performing loans by the Indian public sector banks. *BIS Asian Research Papers*, 16, 1-23.
- Morina, D. (2020). Determinants of Credit Risk in Commercial Banks of Kosovo. *International Journal of Economics & Business Administration (IJEBA)*, 8(2), 179-190.

- Moussa, M. A. B. (2015). The determinants of bank liquidity: case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1), 249-259.
- Muchtar, S., & Rustimulya, G. S. (2019). Determinants of Liquidity Risk In Banking Sector On The Indonesia Stock Exchange. *Jurnal Manajemen*, 23(3), 461-480.
- Munteanu, I. (2012). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance*, 3, 993-998.
- Nikolaidou, E., & Vogiazas, S. D. (2014). Credit risk determinants for the Bulgarian banking system. *International Advances in Economic Research*, 20(1), 87-102.
- Osuagwu, E. (2014). Determinants of bank profitability in Nigeria. *International Journal of Economics and Finance*, 6(12), 46-63.
- Parameswar, N., Murthy, S. R., & Wague, C. (2012). The determinants of bank liquidity during financial crisis: A comparative study of the GCC banking industry. *Journal of Academy of Business and Economics*, 12(3), 10-21.
- Rath, B. N., & Samantaraya, A. (2015). Determinants of Bank Profitability in the Post-reform Period: Evidence from India. *Global Business Review*, 16(5), 82S-92S.
- Rudhani, L. H., Ahmeti, S., & Rudhani, T. (2016). The Impact of Internal Factors on Bank Profitability in Kosovo. *Acta Universitatis Danubius. OEconomica*, (12 (1)), 95-107.
- Samantaraya, A. (2016). Procyclical credit growth and bank NPAs. *Economic and Political Weekly*, 51(12), 112-119.
- 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), 40-53.
- Singh, D. D. (2010). Bank specific and macroeconomic determinants of bank profitability: the Indian evidence. *Paradigm*, 14(1), 53-64.
- Sopan, J., & Dutta, A. (2018). Determinants of liquidity risk in Indian banks: A panel data analysis. *Asian Journal of Research in Banking and Finance*, 8(6), 47-59.
- Sudirman, I. (2015). *Determinants of bank liquidity in Indonesia: Dynamic panel data analysis*. 11th International Annual Symposium on Management, The Singhasari Resort, Batu, Malang, Indonesia. DOI10.2139/ssrn.2583985

- Thiagarajan, S., Ayyappan, S., & Ramachandran, A. (2011). Credit risk determinants of public and private sector banks in India. *European Journal of Economics, Finance and Administrative Sciences*, 34(34), 147-153.
- Vodova, P. (2011). Liquidity of Czech commercial banks and its determinants. *International Journal of mathematical models and methods in applied sciences*, 5(6), 1060-1067.
- Vodova, P. (2013). Determinants of commercial bank liquidity in Hungary. *e-Finanse*, 9(3), 180-188.
- Wanamali, H. A. (2020). *An Evaluation of the Determinants of Bank Liquidity: A Case Study of Commercial Banks in Sri Lanka*. 9th International Conference on Management and Economics.

Chapter - 3
Research Design

CHAPTER - 3

RESEARCH DESIGN

3.1. INTRODUCTION

In the previous chapter, we conducted a thorough review of the extant literature pertaining to the concept of performance and stability parameters of banking institutions. On the basis of the literature reviewed, in this chapter, we now move on to framing of the research design of our study. The research design is divided into five parts as under:

- Defining the scope of the study
- Charting out the objectives of the study
- Setting the period of the study, Data structure, and sample size, and declaring the sources of data
- Setting up the study hypotheses
- Defining the empirical models

3.2. SCOPE OF THE STUDY

The study is confined to the analysis of the Scheduled commercial banks operating in India except for Regional Rural Banks (RRBs) and the Foreign Banks. It includes 45 banks in total from three major bank-groups i.e., State Bank of India Group (6 banks), Nationalized Banks (20 banks), Private Sector Banks (19 banks). These banks have been studied for a period of 10 (FY 2005-06 to 2014-15) years to analyse their performance and stability parameters such as profitability, credit risk, and liquidity risk.

3.3. OBJECTIVES OF THE STUDY

The study has the following objectives:

- To analyse the determinants of profitability of Indian commercial banks
- To analyse the effect of Competition and Market Concentration on bank Profitability
- To analyse the determinants of Credit Risk in Indian commercial banks
- To analyse the impact of excess credit growth in the preceding years on asset delinquency in Indian commercial banks
- To analyse the determinants of liquidity Risk of Indian commercial banks
- To analyse the trend of liquidity holding of the Indian banking sector

3.4. PERIOD OF STUDY

The study will be conducted for a period of 10 years commencing from the financial year (FY) 2005-06 to 2014-15. The choice of the above period is based on the fact that bank-wise data pertaining to all the variables to be used in the estimation models are constantly available from FY 2004-05 onwards. Moreover, new definitions on the classification of NPAs on a 90-day overdue period was notified on 31 March 2004 by the RBI. Further, the Reserve Bank again in FY 2015-16 undertook a thorough Asset Quality Review (AQR) of the bank's balance-sheets, which unearthed huge amounts of substandard and doubtful loans that were either not properly classified or disclosed by the banks. This in turn largely impacted the level of NPAs in the Indian banks. Therefore, to maintain consistency in definitions of the variables across our estimation models and to insulate the models from the effect of the AQR process, the above period of study is selected.

3.5. DATA STRUCTURE AND SAMPLE SIZE

The study will be conducted in three parts i.e., Profitability, Credit Risk, and Liquidity Risk. In each part, the data collected will be arranged into a Panel Data structure. Profitability analysis will be done on 45 Cross-Sections Units, 10 Time Units, and 6 Regressors, thus will have 2,580 data points. For analysing Credit Risk, the study will examine 45 Cross-Sections Units, 10 Time Units, 7 Regressors, and will have 3,010 data points. Finally, for analysing Liquidity Risk the study will examine 45 Cross-Sections Units, 10 Time Units, 7 Regressors, and will have 3,010 data points. Therefore, a total of more than 8,600 data points spread over ten years, will be targeted for the study. The list of the banks that constitute our data sample is presented in the table 3.1, representing the public sector banks from panel code 1 till 26 and the private sector banks from panel code 27 till 45.

Table 3.1: List of Banks and their Panel Codes

Panel Code	Bank Name	Panel Code	Bank Name
1	STATE BANK OF BIKANER & JAIPUR	24	UNION BANK OF INDIA
2	STATE BANK OF HYDERABAD	25	UNITED BANK OF INDIA
3	STATE BANK OF INDIA	26	VIJAYA BANK
4	STATE BANK OF MYSORE	27	AXIS BANK
5	STATE BANK OF PATIALA	28	CATHOLIC SYRIAN BANK LTD
6	STATE BANK OF TRAVANCORE	29	CITY UNION BANK LIMITED
7	ALLAHABAD BANK	30	DCB BANK LIMITED
8	ANDHRA BANK	31	DHANLAXMI BANK
9	BANK OF BARODA	32	FEDERAL BANK
10	BANK OF INDIA	33	HDFC BANK
11	BANK OF MAHARASHTRA	34	ICICI BANK
12	CANARA BANK	35	INDUSIND BANK
13	CENTRAL BANK OF INDIA	36	JAMMU & KASHMIR BANK LTD
14	CORPORATION BANK	37	KARNATAKA BANK LTD
15	DENA BANK	38	KARUR VYSYA BANK
16	IDBI BANK LIMITED	39	KOTAK MAHINDRA BANK LTD
17	INDIAN BANK	40	LAKSHMI VILAS BANK
18	INDIAN OVERSEAS BANK	41	NAINITAL BANK
19	ORIENTAL BANK OF COMMERCE	42	RBL BANK
20	PUNJAB AND SIND BANK	43	SOUTH INDIAN BANK
21	PUNJAB NATIONAL BANK	44	TAMILNAD MERCANTILE BANK LTD
22	SYNDICATE BANK	45	YES BANK LTD.
23	UCO BANK		

3.6. SOURCE OF DATA

All the data pertaining to bank-specific and market/industry-specific variables, used in the study will be extracted from various Reserve Bank of India (RBI) publications such as the Report on Trend and progress of Banking in India, Basic Statistical Returns of SCBs in India, and Statistical Tables Relating to Banks in India. Data on macroeconomic variables will be extracted from RBI's Handbook of Statistics on Indian Economy.

3.7. STUDY HYPOTHESES

We have set the following null hypotheses for our study and have grouped them into three categories i.e., profitability, liquidity risk, and credit risk, which we will test through our empirical models:

(a) Profitability

H₀₁ = *There is no effect of Industry-Specific Variables on bank Profitability.*

H₀₂ = *There is no effect of Bank-Specific Variables on bank Profitability.*

(b) Credit Risk

H₀₁ = *There is no effect of Bank-Specific Variables on bank Credit Risk.*

H₀₂ = *There is no effect of Macroeconomic Variables on bank Credit Risk.*

(c) Liquidity Risk

H₀₁ = *There is no effect of Bank-Specific Variables on bank Liquidity Risk.*

H₀₂ = *There is no effect of Macroeconomic Variables on bank Liquidity Risk.*

3.8. EMPIRICAL MODELS

After defining the scope, objectives study period, data and sample, and hypotheses for our study, we now move on to framing the empirical models to be used to test our study hypotheses. While framing the empirical models pertaining to profitability, credit risk, and liquidity risk of Indian banks, we will first chart out a conceptual framework for each of the models and then define their model specifications.

3.8.1 Profitability

Model Framework

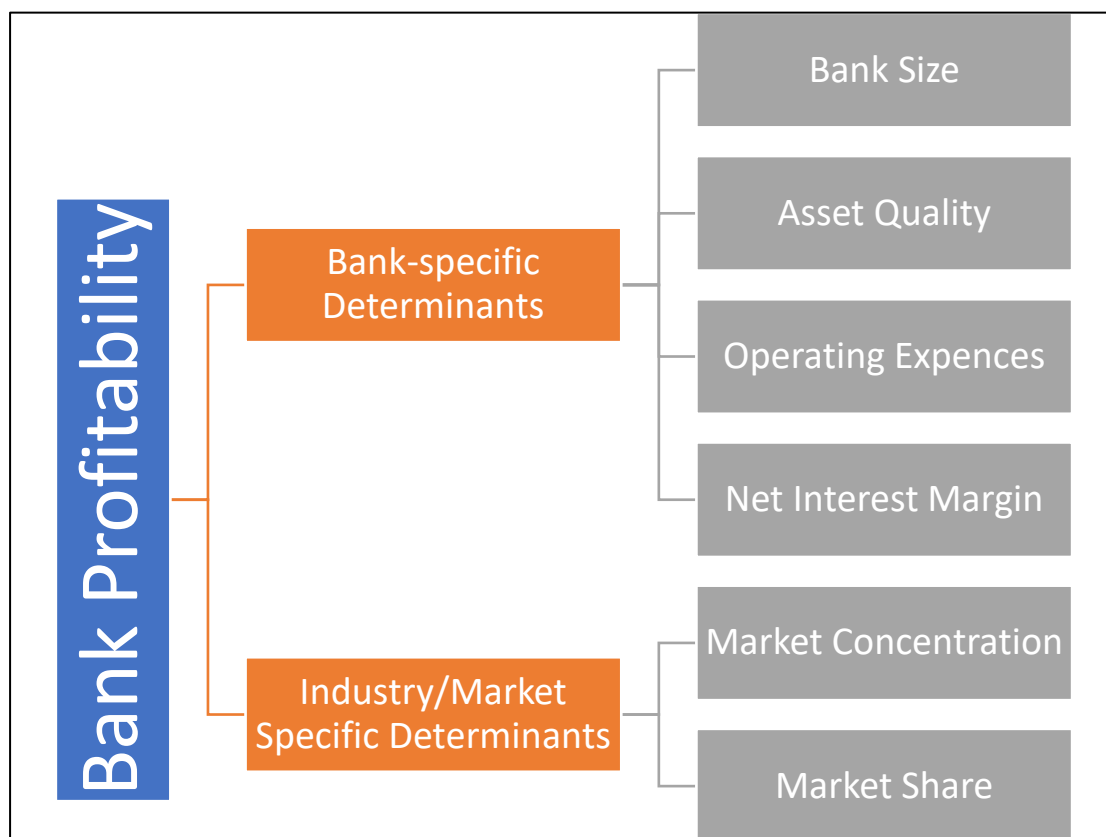
After reviewing the extant literature on bank profitability and drawing insights from prominent studies in the Indian context such as the studies by Singh (2010), Seenaiah et al. (2015), and Barua et al. (2016), we can now define a conceptual framework for our empirical model by defining the various bank-specific and market/industry-specific variables which determine the profit earning capacity of Indian banks and their expected relationships. The bank-specific-variables used in our empirical model comprises of bank size, quality of assets held by a bank, level of operating expenses of the bank, and the bank's net interest margin, while the market share and market concentration constitute the market/industry-specific variable as depicted in the figure 4.1. The expected relationship of the various variables with the profitability level of banks is stated as follows: -

Bank Size – The overall size of a bank defined by the total assets held by it has a positive relationship with the bank's profit-earning capacity. Large banks generally indulge in wholesale banking activities and diversification of their asset portfolios which makes them reap higher levels of returns from their assets when compared to their smaller

counterparts. Thus, as the size of the banks increases their ability to earn higher returns from their assets also increases.

Asset quality – The quality of assets held by a bank determines its capacity to generate operating income and also the returns earned from its assets. As the level of impaired loans increases, they cease to generate income and also the expected return from the assets which in turn also reduces the profitability levels of the bank. Therefore, the quality of assets determined by the level of impaired loans has a negative relationship with a bank’s profitability levels.

Figure 3.1: Profitability Determinants of Indian Banks



Operating Expenses – The expenses incurred by a bank on paying wages, operation of its branches, administrative expenses, etc constitute its overall operating expenses. The

level of operating expenses with respect to a bank's total assets reduces the total revenue generated from its banking operations. Thus, the level of operating expenses incurred by a bank has a negative relationship with its overall profitability.

Net Interest Margin – The difference of interest earned and the interest expended with respect to its total assets holding determines its net interest margin. It is the bank's total revenue earned from its interest-bearing operations and has a positive effect on its profitability levels. Thus, the net interest margin has a positive association with a bank's level of profitability.

Market concentration – Market concentration or the level of competitiveness in a market has a bearing on the profitability of a bank. As the market concentration increases, inferring a lower level of competitiveness which leads to the monopolistic position being held by some banks or even comparatively higher market share being held by a few banks. This in turn increases the profitability of the banks operating in that particular market. Thus, the concentration level in the market positively affects a bank's profit-earning capacity.

Market Share – The total share of deposits or the total advances held by a bank with respect to the sum total of all the deposits or advances of all the banks put together in a given market determines its market share. As the market share of a bank increases its holdings of both deposits and advances also rises, which enables it to put the higher level of deposits into diversified assets and a higher share of advances in form of loans to earn better returns. Thus, the market share of a bank has a positive relationship with its level of profitability.

Model Specification

Econometric Model- Panel Data (balanced)

Cross Section Units- 45

Time Units- 10 (FY 2005-06 – FY 2014-15)

Model Equation: -

$$ROA_{it} = \alpha + \beta_1 HHI_t + \beta_2 MS_{it} + \beta_3 NIM_{it} + \beta_4 NPATA_{it} + \beta_5 LNNTA_{it} + \beta_6 OXPTA_{it} + u_i + \epsilon_{it}$$

Where: -

1) Dependent Variable- ROA (Return on Asset)

2) Independent Variables: -

a) Industry/Market-specific Variables

- Market Structure (HHI) - HHI concentration Index

HHI Index Model

$$HHI_t = \sum_{i=1}^n S_i^2$$

S_i = Share of assets of i th bank in total assets of all banks in t th year.

- Market Share (MS) - Share of deposits of i -th bank / total deposits of all banks in t -th year as a proxy of competition.

b) Bank-specific Variables

- Net Interest Margin (NIM)
- Net Non-performing Assets to total Advances Ratio (NPATA)
- Size of the Bank (LNNTA) – Natural log of Total Assets
- Operating Expenses to total Assets (OXPTA)

3.8.2. Credit Risk

Model Framework

After reviewing the extant literature on bank Credit risk and drawing insights from prominent studies in the Indian context such as the studies by Misra and Dhal (2010), Thiagarajan *et al.* (2011), and Samantaraya (2016), we can now define a conceptual framework for our empirical model by defining the various bank-specific and macroeconomic variables which determine the loan delinquency rate of Indian banks and their expected relationships. The bank-specific-variables used in our empirical model comprises of bank size, the effect of excessive credit growth, the impact of priority sector lending, assets restructuring, bank profitability, and the level of accumulated past bad loans, while the growth rate of GDP constitutes the macroeconomic variable as depicted in the figure 4.2. The expected relationship of the various variables with the liquidity holdings of banks is stated as follows: -

Bank Size – The overall size of a bank defined by the total assets held by it has a negative relationship with the bank’s liquidity holdings. Large banks generally indulge in wholesale banking activities and diversification of their asset portfolios which makes them less prone to the risk of asset delinquency when compared to their smaller counterparts. Thus, as the size of the banks increases their exposure to the problem of credit risk decreases.

Excessive credit growth – The excessive growth in credit lending by a bank has a positive relationship with its asset delinquency rate. In times of economic boom, the banks tend to lend credit to riskier ventures as they are burdened with excess deposit rates resulted from increased economic activities. Moreover, in India, the banks were also compelled by the government to lend to infrastructure development projects during

the period of higher economic growth which was not of the highest standards and turned out to be delinquent in the later periods.

Priority sector lending – The proportion of loans issued by a bank to fund the key priority sectors such as agriculture, lending to medium and small-scale enterprises, infrastructure projects, etc constitute their proportion of priority sector lending and are mandated by the Reserve Bank of India. These lending practices are often backed by the government or the repayments of these loans are often waved off as the government makes the repayment on the borrower’s behalf. Thus, the priority sector loans are generally insured from becoming delinquent, which in turn has a negative effect on the credit risk of the banks.

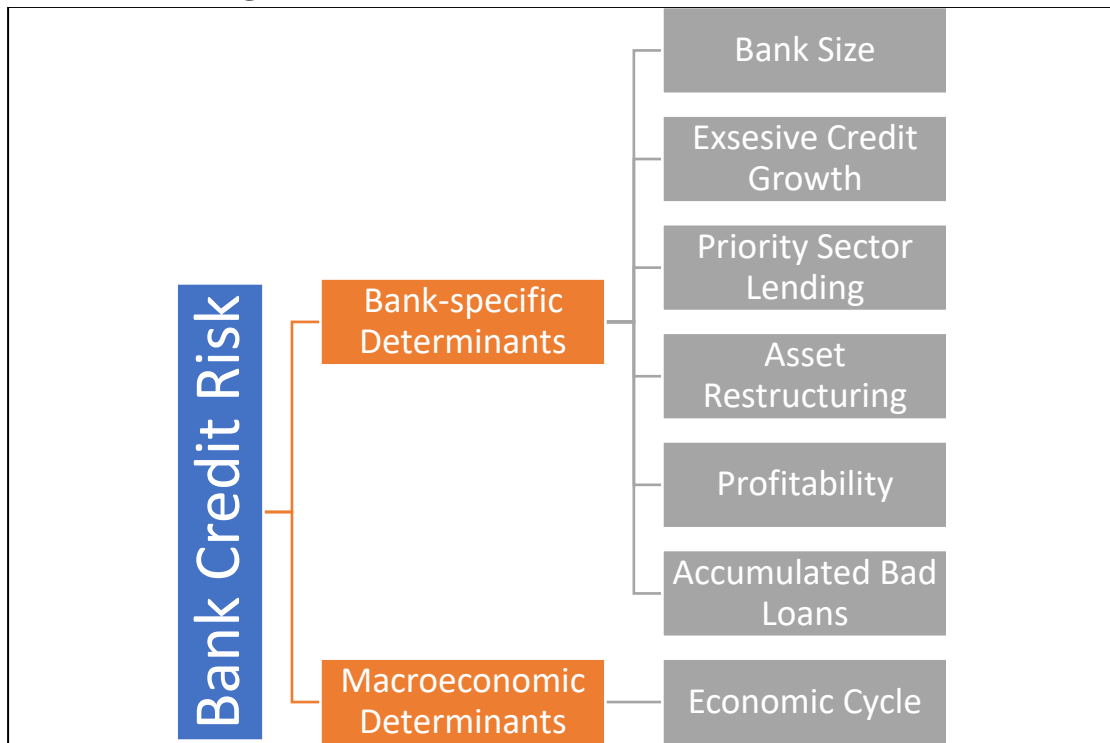
Asset restructuring – The practice of asset restructuring negatively affects the delinquency rates of loans of a bank. Restructuring doubtful assets into standard assets lead to evergreening of loans and also reduces the actual amount of bad loans in the current year, as they would have been otherwise leveled as non-performing or doubtful loans.

Profitability – Profitability levels of a bank can have both positive and negative impacts on its rate of asset delinquency as it purely depends on the management practices of the bank. As banks become more profitable, they may engage in riskier credit lending policies in order to peruse higher returns, which may increase their level of credit risk. On the other hand, profitable banks generally diversify their assets portfolio to reduce overall risk, which may lead to lower delinquencies among its assets thereby reducing their credit risk.

Accumulated bad loans – The accumulation of bad loans from the previous years have a positive association with the current year’s asset delinquency rate. The accumulation

of delinquent assets impairs the credit lending ability of banks as they need to adhere to the capital adequacy norms, this brings down the issuance of new advances thereby increasing the proportion of bad loans out of the total advances issued.

Figure 3.2: Credit Risk Determinants of Indian Banks



Economic cycle – The growth rate of the gross domestic product represents the changes in the economic cycles and can have both a negative or positive impact on a bank’s credit risk. In the times of economic boom, the asset delinquency rates of banks decline as most of the loans issued by them get repaid in time and thus can negatively affect the overall credit risk of the bank. Similarly, in times of economic distress, the delinquency rates of loans rise which in turn increases the credit risk of banks.

Model Specification

Econometric Model- Panel Data (balanced)

Cross Section Units- 45

Time Units- 10 (FY 2005-06 – FY 2014-15)

Model Equation: -

$$NPATA_{it} = \alpha + \beta_1 LDGC_{it} + \beta_2 LNNTA_{it} + \beta_3 SDATA_{it} + \beta_4 LNPA_{it-1} + \beta_5 ROA_{it} + \beta_6 PRSLTA_{it} + \beta_7 GDP_t + u_i + \epsilon_{it}$$

Where: -

1. Dependent Variable- NPATA (Net Non-performing Assets/Total Advances)
2. Independent Variables: -
 - (LDGC) - Lagged Credit Growth
 - (LNNTA) Size of the Bank - Natural log of Total Assets
 - (SDATA) -Restructured Standard Advances to total Advances
 - (LNPA_{it-1}) - One Period Lagged LNPA
 - (ROA) - Return on Asset
 - (PRSLTA) - Prior Sector Lending to total Advances
 - (GDP) – GDP Growth

3.8.3. Liquidity Risk

Model Framework

After reviewing the extant literature on bank liquidity risk and drawing insights from prominent studies in the Indian context such as the studies by Singh and Sharma (2016), Sopan and Dutta (2018), and Bhati et al. (2019), we can now define a conceptual framework for our empirical model by defining the various bank-specific and macroeconomic variables which determine the liquidity risk of Indian banks and their expected relationships. The bank-specific-variables used in our empirical model

comprise bank size, rate of deposits, cost of funding, quality of assets, and the level of capital adequacy, while the growth rate of GDP and the rate of inflation constitute the macroeconomic variables as depicted in the figure 4.3. The expected relationship of the various variables with the liquidity holdings of banks is stated as follows: -

Bank Size – The overall size of a bank defined by the total assets held by it has a negative relationship with the bank's liquidity holdings. Large banks generally maintain lower levels of liquid assets in their books when compared to their smaller counterparts, as the larger banks possess the capacity to fund and arrange liquid assets whenever there arises a shortage of liquid assets by even borrowing at a higher cost.

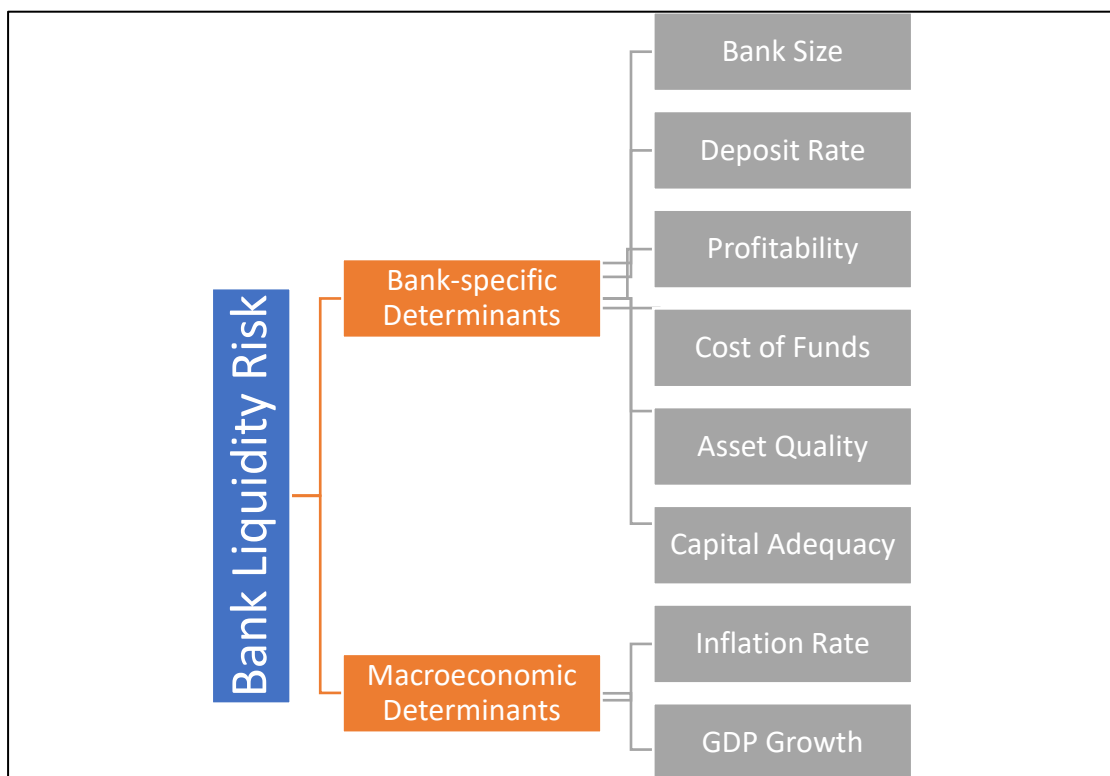
Deposit Rate – The level of deposits held by a bank positively affects its liquidity position. As deposits constitute to be a major component of liquid assets held by a bank, any reduction in the level of deposits caused by an unexpected rate of withdrawals would definitely decrease the liquidity level of the bank.

Profitability – The profitability level of a bank determines its ability to engage in more risky businesses and also increases its ability to fund liquidity shortages efficiently. A highly profitable bank would maintain lesser liquid assets as compared to a lesser profitable bank. Thus, as the profitability level of a bank rises the liquidity buffer held by it declines.

Cost of funds – The cost of funding of a bank determines the level of liquid assets it keeps on its books. As the funding cost increases the ability of a bank to borrow and fund the acquisition of liquid assets decreases. Therefore, when the cost of funds is low the banks tend to build upon their liquidity buffers. Thus, the funding cost has a negative relationship with the liquidity position of a bank.

Asset quality – The quality of assets held by a bank determines its capacity to generate operating income and also fund the acquisition of liquid assets. As the level of impaired loans increases, they cease to generate income in the form of cash in hand which in turn also reduces the liquidity position of the bank. Therefore, the quality of assets determined by the level of impaired loans has a negative relationship with a bank’s liquidity position.

Figure 3.3: Liquidity Risk Determinants of Indian Banks



Capital adequacy – The level of capital maintained by a bank facilitates the creation of more liquidity as and when needed by the bank. It also increases the ability of banks to bear higher risk as with a higher level of capital they can borrow at a lower cost. Thus, the capital adequacy level has a positive relationship with bank liquidity.

Inflation rate – The rate of inflation in an economy increases the flow of cash in the markets thus increases the general price level. This overall increase in the circulation

of cash in the economy leads to a higher level of liquidity in the banking system as well. Thus, the rate of inflation has a positive relationship with the liquidity position of a bank.

GDP growth – The rate of growth in the GDP of a country indicates economic growth and prosperity, also positively influences the performance and stability of the banking sector. But while reviewing the extant literature we found that the banks follow different liquidity policies with respect to the changes in economic cycles. Thus, the GDP growth can have both negative as well as positive relationship with bank liquidity

Model Specification

Econometric Model- Panel Data (balanced)

Cross Section Units- 45

Time Units- 10 (FY 2005-06 – FY 2014-15)

Model Equation: -

$$LIQTA_{it} = \alpha + \beta_1 NIM_{it} + \beta_2 COF_{it} + \beta_3 LNNTA_{it} + \beta_4 DTL_{it} + \beta_5 NPATA_{it} + \beta_6 CAR_{it} + \beta_7 GDP_t + \beta_8 INF_t + u_i + \epsilon_{it}$$

Where: -

1. Dependent Variable- LIQ (Liquid assets over total Assets)
2. Independent Variables: -
 - (NIM) - Net Interest Margin
 - (COF) - Cost of Funding
 - (LNNTA) Size of the Bank - Natural log of Total Assets
 - (DTL) - Deposits over total Liabilities
 - (NPATA) - Net Non-performing Assets to total Advances Ratio
 - (CAR) - Capital Adequacy Ratio Tier - 1
 - (GDP) – GDP Growth (Current Prices)
 - (INF) – CPI Inflation rate

3.9. CONCLUSION

In this chapter we laid out the research design for our study, which included defining the scope of the study, charting out the objectives of the study, setting the period of the study, data structure, and sample size, and declaring the sources of data, setting up the study hypotheses and defining the empirical models to be used. From the next chapter onwards, we will put to use our various empirical models and analyse the obtained results.

REFERENCES

- Barua, R., Roy, M., & Raychaudhuri, A. (2016). Structure, conduct and performance analysis of Indian Commercial Banks. *South Asian Journal of Macroeconomics and Public Finance*, 5(2), 157-185.
- Bhati, S., De Zoysa, A., & Jitaree, W. (2019). Factors affecting the liquidity of commercial banks in India: a longitudinal analysis. *Banks and Bank Systems*, 14(4), 78.
- Misra, B. M., & Dhal, S. (2010). Pro-cyclical management of banks' non-performing loans by the Indian public sector banks. *BIS Asian Research Papers*, 16, 1-23.
- Samantaraya, A. (2016). Procyclical credit growth and bank NPAs. *Economic and Political Weekly*, 51(12), 112-119.
- Seenaiyah, K., Rath, B. N., & Samantaraya, A. (2015). Determinants of bank profitability in the post-reform period: Evidence from India. *Global Business Review*, 16(5_suppl), 82S-92S.
- 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), 40-53.
- Singh, D. D. (2010). Bank specific and macroeconomic determinants of bank profitability: the Indian evidence. *Paradigm*, 14(1), 53-64.
- Sopan, J., & Dutta, A. (2018). Determinants of liquidity risk in Indian banks: A panel data analysis. *Asian Journal of Research in Banking and Finance*, 8(6), 47-59.
- Thiagarajan, S., Ayyappan, S., & Ramachandran, A. (2011). Credit risk determinants of public and private sector banks in India. *European Journal of Economics, Finance and Administrative Sciences*, 34(34), 147-153.

Chapter - 4

Determinants of Profitability

CHAPTER - 4

DETERMINANTS OF PROFITABILITY

4.1. INTRODUCTION

In the previous chapter, we laid out the research design for our study and defined the theoretical framework, and specified the empirical models to be used. Now we move forward to the estimation of the specified models. We will first delve into the analysis of the parameter pertaining to the performance of Indian banks by analysing the profitability determinants in this present chapter and then proceed to the analysis of the stability parameters in the subsequent chapters.

The present chapter examines the factors that affect the profitability of Indian banks by analysing the bank-specific and market-specific determinants that influence a bank's profit-earning capacity.

4.2. BACKGROUND

A more efficient banking system can effectively mobilize and allocate resources for accelerating economic growth. The depletion in the profitability of banks is more likely to affect the solvency ratios which ultimately threaten the economic system. A high degree of competition and efficiency in the banking system can contribute to greater financial stability and product innovation, which in turn can improve the prospects for economic growth. The Indian commercial banks, particularly the public sector banks have been facing stiff competition from the entry of new private sector banks and foreign banks into the Indian banking sector as with the entry of these new market players, domestic as well as international, the market share of the public sector banks

has started to see a gradual decline. This has created the need for improving business efficiency and increasing the business volume of public sector banks to boost their profitability levels (Bhattacharya *et al.*, 1997). It has been observed that although the banks are operating in the same economic environment yet the profitability of banks are at different levels.

To achieve substantial progress in the financial system of India, the banking sector must be efficient and should not continue to operate at low profitability. Thus, for boosting banking performance, a lot of initiatives were taken from time to time, such as, deregulation, equity share, and branch licenses, which were mostly based on the Narasimham Committee Report of 1991. The gradual relaxation of reserve ratios and several quantitative restrictions were implemented for improving bank profitability (Athanasoglou *et al.*, 2008). The several changes that have taken place in the Indian banking system in terms of its operational autonomy and ownership, such as, collaborations, mergers and acquisitions, new banking services, and advances in information technology available to banks, are likely to enhance aggregate banking performance and thereby improve its profitability.

The performance and changes in profitability of a bank, regardless of its ownership are determined by two sets of variables: (a) the impact of market/industry-specific variable and (b) bank-specific variables (Athanasoglou *et al.*, 2008; Sanyal and Shankar, 2011). The present study seeks to incorporate all the above categories of variables for estimating the profitability of the Indian banking sector. The market/industry-specific variables include market concentration and market share. The bank-specific variables include bank size, asset quality, operating expenses, and net interest margin.

4.3. TRENDS OF PROFITABILITY, MARKET CONCENTRATION AND MARKET SHARE IN THE INDIAN BANKING SECTOR

The table 4.1 and the figure 4.1 presents the computed Herfindahl-Hirschman Index (HHI) for the banks operating in India for a period of 12 years from FY 2004-05 to 2015-16. The HHI index is a widely used technique to ascertain the market concentration or the competitiveness within a particular market. It is computed by using the summation of the squared market share of each firm participating in a market for a given year. The value of the index can range from 1 to 10,000, representing a least concentrated or a highly competitive market to a fully concentrated market or a market monopoly respectively. Further, a level of HHI below 1500 denotes that the market is fairly competitive, an HHI value between 1500-2500 indicates moderate concentration and an HHI value exceeding 2500 represents a concentrated market.

It can be observed from the table 4.1 and the figure 4.1 that the Indian banking sector remained fairly competitive as the HHI value persisted below 1500 level during the observed period, and it reached its highest level of market concentration at the beginning of the period i.e., during FY 2004-05. Further, it started to gradually decline till FY 2007-08, as during this period the new private and foreign entrants in the Indian banking sector started to gain market share, which was previously held by the public sector banks as depicted in the figure 4.2. Then again during FY 2008-09, it can be observed that there was a sharp rise in the level of market concentration in the banking sector, which can be attributed to the global financial crisis of 2008. As during the crisis period, the private and the foreign banks lost considerable market share to the public sector banks, due to the public perception of public sector banks as safer places to park their deposits because these banks were backed by the government and would be bailed out in case any of these banks failed (Acharya & Kulkarni, 2012). Moreover, the foreign

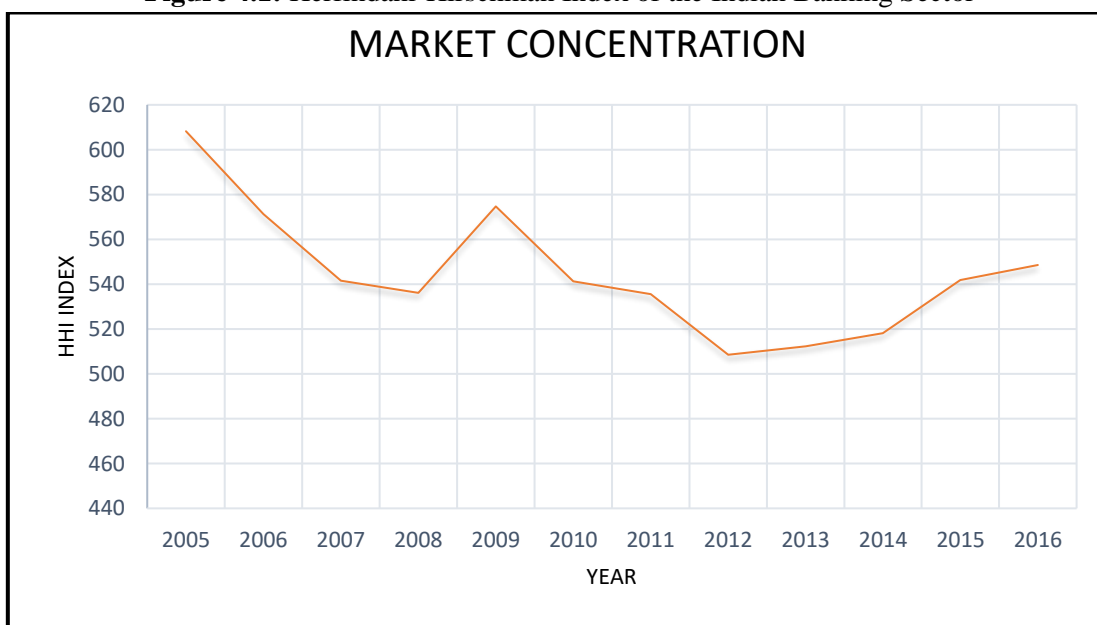
banks, during the period of the crisis had to move away a lot of their resources to their parent organisations, in order to remain solvent (Dinger, 2009). From FY 2009-10 till FY 2013-14 it can be observed that the market concentration level witnesses a steady decline denoting improved competition among the banks operating in India.

Table 4.1: Herfindahl-Hirschman Index of the Indian Banking Sector

Year	Nationalised Banks	SBI Group Banks	Private Banks	Foreign Banks	Total	HHI
2005	20	8	29	31	88	608
2006	20	8	28	29	85	571
2007	20	8	25	29	82	542
2008	20	8	23	28	79	536
2009	20	7	22	31	80	575
2010	20	7	22	32	81	541
2011	20	6	21	34	81	536
2012	20	6	20	41	87	509
2013	20	6	20	43	89	512
2014	21	6	20	43	90	518
2015	21	6	20	44	91	542
2016	21	6	21	45	93	549

Source: Computed HHI Index

Figure 4.1: Herfindahl-Hirschman Index of the Indian Banking Sector

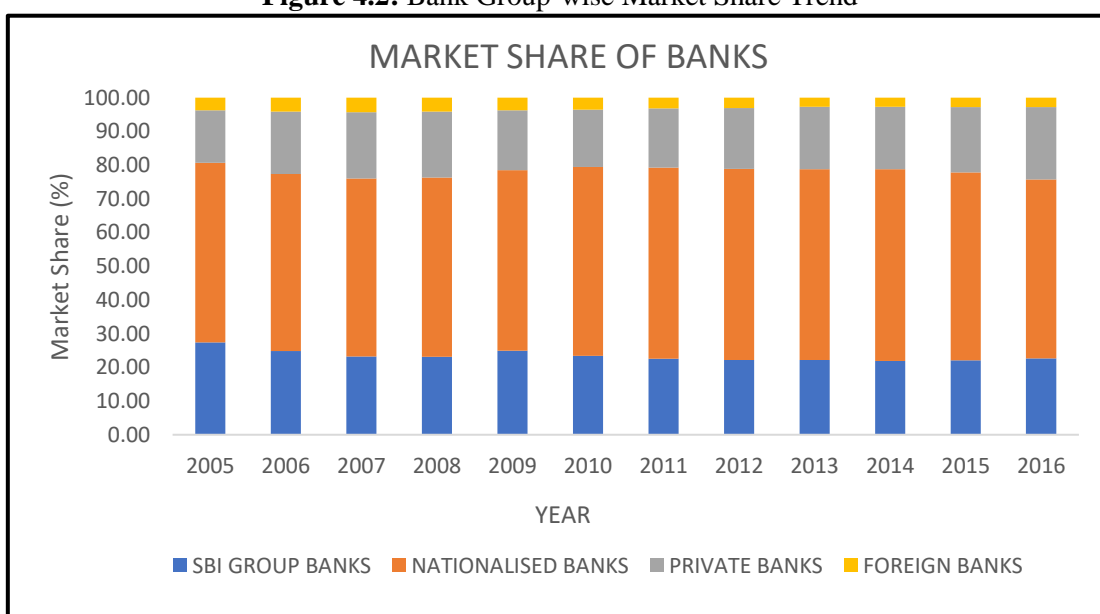


Source: Computed Figure

After the effects of the financial crisis started to subside, both the private and the foreign banks started to regain the market share which they lost to their public sector counterparts. The market competitiveness started to again decline from FY 2014-15 onwards, as a fewer number of consolidated private sector banks captured market share from both the foreign and public sector banks.

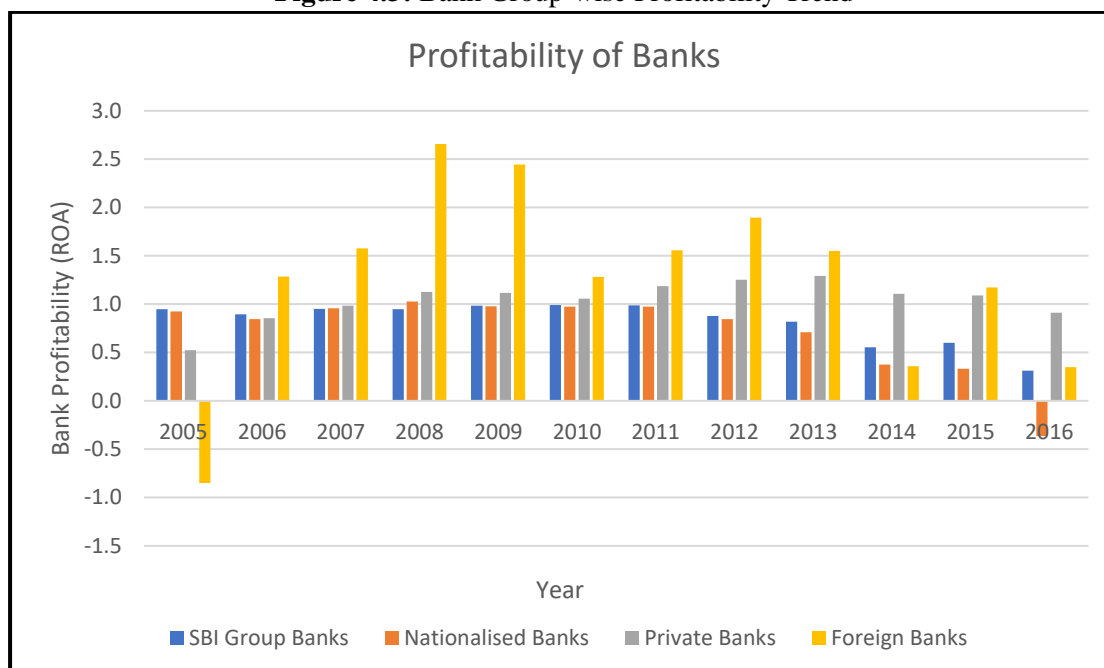
Further, an analysis of the market share trend (illustrated in the figure 4.2) reveals that the Indian banking sector is predominantly constituted of the public sector banks comprising of the Nationalised banks and the SBI group banks. Both these public sector bank groups have a direct and a significant government shareholding, and together they control roughly eighty percent of the Indian banking intermediation. The market share of these public banks remained more or less at the same level during the period of observation with occasional loss of market share to the private and foreign banks. From FY 2014-15 onwards, we can see a slight improvement in the market share of the private banks propelled mainly by the entry of two new private banks and also due to consolidation among the private players in the Indian banking sector.

Figure 4.2: Bank Group-wise Market Share Trend



Source: Computed Figure

Figure 4.3: Bank Group-wise Profitability Trend



Source: Computed Figure

Moreover, an analysis of the profitability trend of the Indian banking sector, (illustrated in the figure 4.3) reveals that the profitability level of the public sector banks measured by their ROA (Return on Assets) remained below 1 percent throughout the period of study and to see a sharp decline from FY 2014-15 onwards. On the other hand, the public sector banks initially had lower levels of profitability but from FY 2007-08 onwards started to post higher ROA and even went past the public sector banks despite having a lower share of the market. Finally, among the bank groups, the foreign banks reported the highest level of profitability as they do not indulge in traditional retail banking in India, rather they engage in wholesale banking activities such as Forex transactions, securitisation underwriting, etc which diversifies their asset classes and ensures higher profitability. But in the FY 2016-17, even the foreign banks' profitability went below 0.5 percent level and the public sector banks as a group posted negative ROA or net losses for the first time during our study period.

4.4. VARIABLES USED IN THE PAST STUDIES

Several studies have been carried out globally on the credit risk of banks, of which the prominent ones include Căpraru and Ilnatov (2015), Alshatti (2016) and Kawshala and Panditharathna (2017), who studied the profitability determinants of European banks, Jordanian banks, and Sri Lankan banks respectively. The other prominent literature on the profitability of banks includes studies from South East European countries such as Greece, Croatia, and Kosovo (Athanasoglou *et al.*, 2008), (Kundid *et al.*, 2011), (Rudhani *et al.*, 2016) and studies from Africa (Osugwu, 2014; Garcia and Trindade, 2019). Further, Singh (2010), Seenaiyah *et al.* (2015), Barua *et al.* (2016), and Almaqtari *et al.* (2018), constitute the most prominent studies from India that analysed the factors affecting the profitability of the Indian banks. From examining these studies and a survey of other relevant literature pertaining to bank profitability it can be summed up that asset delinquency of banks is a function of both internal and external factors. The internal factors are bank-specific whereas the external factors comprise of both market/industry-specific and macroeconomic determinants which are bank irrelevant. The bank-specific factors include bank size, asset quality, operating expenses, and the net interest margin. While among the external factors, inflation rate and GDP growth constitute the macroeconomic determinants, and the market/industry-specific determinants comprises of market concentration and market share.

4.4.1. Bank-Specific Determinants

The size of the banks and the net interest margin earned by the banks have been found to have a positive association with its level of profitability. Kundid *et al.* (2011), Alshatti (2016), Rudhani *et al.* (2016), and Almaqtari *et al.* (2018), found that the size of a bank in terms of total assets has a significant bearing on the amount of profits that the bank earns. They observed that size of the bank was positively related to the

profitability level of banks. However, Barua *et al.* (2016) found a negative relationship between bank size with its profitability, while analysing the determinants of profitability of Indian banks. Further, the net interest margin earned by a bank influences its profitability level and it has been found to have a positive relationship with the latter, which was reinforced by the findings of Seenaiyah *et al.* (2015), Rudhani *et al.* (2016), and Garcia and Trindade (2019).

The bank-specific factors that were found to have a negative association with a bank's profit-earning capacity include the amount of operating expense with respect to its total assets and the quality of assets measured by the level of impaired loans in its books. Singh (2010), Seenaiyah *et al.* (2015), and Kawshala and Panditharathna (2017) found that the level of operating expenses incurred by a bank has a negative effect on the level of its profitability. While the studies by Osuagwu (2014) and Almaqtari *et al.* (2018) found a positive association between the operating expenses of a bank and its profitability. Further, the quality of assets held by a bank represented by the amount of bad or delinquent loans in its balance sheet was found to have a significant negative impact on the profit earning capacity of the bank. Almost all the literature surveyed pertaining to bank profitability provides evidence of a negative association of asset quality and bank profitability (Osuagwu, 2014; Căpraru and Ihnatov, 2015; Seenaiyah *et al.*, 2015).

4.4.2. Macroeconomic Determinants

The macroeconomic factors that were found to influence the profitability level of banks, comprised of the rate of inflation and the growth rate of GDP. The rate of inflation was found to have a negative relationship with bank profitability. Singh (2010), Seenaiyah *et al.* (2015), and Almaqtari *et al.* (2018) found that the rate of inflation had a negative but statistically insignificant effect on a bank's profit-earning capacity. The growth rate

of GDP was found to have a positive effect on the profitability of banks. The studies that were found to have a positive but statistically insignificant association of GDP growth or economic cycles on profitability level of banks include those of Barua *et al.* (2016) and Almaqtari *et al.* (2018). Thus, it was observed that in all the studies on bank profitability pertaining to the Indian banking sector was not affected by the macroeconomic factors as their association with bank profitability was found to be statistically insignificant.

4.4.3. Market-specific Determinants

The portability of a bank is also found to be impacted by the market-specific factors such as the market concentration or the level of competition in the market and the market share of the bank with respect to the share of its deposits to the total deposits in all the banks put together in that particular market. Osuagwu (2014) and Garcia and Trindade (2019) in their studies on the profitability determinants of the banks in Nigeria and Angola respectively, found that the concentration level in the market and the market share of banks had a positive and statistically significant association with the profitability of the banks. Further, Căpraru and Ihnatov (2015), in their study of Eurozone banks found that the market concentration had a negative but statistically insignificant effect on the profitability of the European banks. Moreover, Barua *et al.* (2016) in their analysis of profitability determinants of the Indian banks found that the market concentration had a positive impact on the profit levels of the banks in India, while the market share of the bank was found to have a negative impact on bank profitability.

4.5. OBJECTIVES, RATIONALE AND HYPOTHESES

The present chapter has two primary objectives, the first objective is to identify the major determinants of profitability in the Indian banking sector with a special focus on the various bank-specific and market/industry-specific factors that affect the profit earning capacity of the Indian banks as identified while reviewing existing literature on bank profitability. The second objective set for this chapter is to analyse the effect of the level of market concentration or competitiveness in the market on the level of profitability in Indian commercial banks.

The Foreign banks operating in India are not considered in the study for two main reasons, one being the fact that the preliminary trend analysis of the market share of various bank groups in the Indian banking industry observed during the period of the study revealed that these banks have very low market share i.e., less than five percent and do not have a significant presence in the Indian banking intermediation space. And secondly, the regressors to be used in the estimation model such as the quality of assets determined by the level of impaired loans and the spread of the net interest margin, do not affect the profitability of the foreign banks operating in India as these banks indulge less in retail banking activities and rather in wholesale banking activities which involves underwriting, securitisation, loan syndication and facilitating foreign exchange transactions. Therefore, estimating the foreign bank's profitability through the said regressors in the model would yield erroneous results. Moreover, the choice of a panel data framework over other econometric models is done to factor in the cross-section effect of each bank in the panel observed over the period of study.

Before proceeding to the development of the empirical model for our study we have set the following null hypotheses for our study which we will test through our empirical models: -

H₀₁ = There is no effect of Bank-Specific Variables on bank Profitability.

H₀₂ = There is no effect of Market-Specific Variables on bank Profitability.

Similarly, the alternative hypotheses set for our study are set as the following: -

H_{a1} = There is an effect of Bank-Specific Variables on bank Profitability.

H_{a2} = There is an effect of Market-Specific Variables on bank Profitability

4.6. EMPIRICAL MODEL

4.6.1. Measurement of Variables

The level of profitability in the banking sector can be measured through various ratios such as Return on Assets, Return on Equity, and the Net Interest Margin. After an extensive review of relevant literature pertaining to the profitability of Indian banks, it has been observed that there is a unanimous agreement among researchers over the use of Return on Assets or ROA as a proxy for measuring the bank profitability and it is represented in this study by the variable ROA. Therefore, ROA is the dependent variable used in the model for the estimation of bank profitability and its determinants.

Further, appropriate variables that are expected to influence the profitability of banks have been selected after a thorough examination of the existing literature and keeping in view the dynamics of the Indian banking sector. Moreover, the explanatory variables are grouped into Bank-Specific variables and Market Specific variables.

Among the Bank-Specific variables, Bank Size is an important determinant of bank profitability, which is calculated by taking the natural logarithm of the total assets of a bank and is expected to have a positive effect as larger banks indulge in businesses other than traditional lending operations thus diversifying their sources of revenue, which in turn ensures higher profits. Further, the net interest margin is also expected to have a positive association with the profitability level of banks and in this study, it is measured by the variable NIM. It is calculated as the percentage of net interest margin (interest earned – interest expended) divided by the total assets of the bank.

The explanatory variables which are expected to have a negative effect on the profitability of a bank include operating expenses and asset quality. The variable operating expenses is defined as the ratio of the operating expenses over total assets. In the present study, it is symbolized as OXPTA. While asset quality is represented by the variable NPATA and is calculated by the ratio of non-performing assets over total assets.

The market-specific variables comprise of the market concentration and the market share of banks. The market concentration is measured by computing a Herfindahl-Hirschman index of banks operating in India, while the market share of banks is measured by the ratio, share of deposits of an individual bank divided by the total deposits of all the banks put together in a particular year. The market concentration level and the market share of banks are represented by the variables HHI and MS in the study and both the variables are expected to have a positive association with bank profitability. Table 4.2. gives a summary of the description and measurement of the variables used in the model and the expected relationship between the regressors and the dependent variable.

4.6.2. Data and Sample

The study is conducted in a panel data framework consisting of 45 banks as cross-section units observed over a period of 10 years from FY 2005-06 to FY 2014-15, with 450 bank-year observations. The present study confines to the Indian banks only, comprising of the nationalised banks, the SBI group banks, and the private banks operating in India. Data pertaining to both the banks specific and market-specific variables such as bank size, asset quality, operating expenses, net interest margin, market concentration, and market share have been extracted from various RBI publications such as Reports on Trend and Progress of Banking in India, Basic Statistical Returns of SCBs in India and Statistical Tables Relating to Banks in India.

Table 4.2: Summary of Variables, Measurement and Expected Relationship

Dependent Variable	Proxy	Measurement	
Profitability	ROA	100*(Net profit for the year)/(Total Assets)	
Independent Variable	Proxy	Measurement	Expected Sign
Bank Size	$LNTA_{it}$	Log of total Assets	+
Asset Quality	$NPATA_{it}$	Net (Non-Performing Assets)/ (Total Advances)	-
Operating Expenses	$OXPTA_{it}$	Ratio of (Operating Expenses)/ (Total Assets)	-
Net Interest Margin	NIM_{it}	100*(Interest Earned - Interest Expended)/Average (Total Asset)	+
Market Concentration	HHI_t	Computed Herfindahl-Hirschman market concentration index for the Indian banking sector	+
Market Share	MS_{it}	(Share of deposits of i th bank) / (total deposits of all banks in t th year)	+

Source: Based on Priori Information

4.6.3. Methodology

The present study analyses the determinants of profitability of Indian banks using a panel data model. The choice of using a panel-data regression model over a pooled OLS model is done to account for the bank-specific effect or the cross-section heterogeneity and to enhance the robustness of the estimates by increasing the number of observations

(Wooldridge, 1999). Algebraically, the panel data regression model is represented in the equation (1):

$$ROA_{it} = \alpha + \beta_1 HHI_t + \beta_2 MS_{it} + \beta_3 NIM_{it} + \beta_4 NPATA_{it} + \beta_5 LNNTA_{it} + \beta_6 OXPTA_{it} + u_i + \epsilon_{it} \quad ..(1)$$

where *ROA* is the dependent variable, which measures the profitability level of banks. It is measured as a percentage of net profits over total assets. *LNNTA* or natural log of total assets absorbs the bank size effect, while *NIM* denotes the net interest margin. Both *LNNTA* and *NIM* are expected to have a positive association with the dependent variable *ROA*. The variables *NPATA* and *OXPTA* represent the quality of assets determined by the proportion of impaired loans out of the total advances held by a bank and the operating expenses over total assets respectively. Both the variables are expected to have a negative effect on the bank profitability. *HHI* and *MS* constitute the market-specific variables representing market concentration and market share respectively and are expected to positively influence the profitability level of the Indian banks.

The symbols α and β denote the intercept and the slope coefficient of the explanatory variables, u_i is the unobserved bank-specific effect and ϵ_{it} is the error term that is independently and identically distributed among the banks and years. There exists a divergence of opinion among econometricians regarding the treatment of the cross-section effect term u_i , and hence in the choice of the appropriate model between fixed effects (FE) and random effects (RE) models (Baltagi, 1995). Therefore, in the present study, the Hausman test is used to choose between FE and RE.

4.7. RESULTS AND DISCUSSION

Before proceeding with the estimation model, a preliminary analysis of descriptive statistics (illustrated in Table 4.3.) is undertaken at this stage. ROA, the dependent variable in the model has a standard deviation of 0.54 which is within a normal range, without excess variation, and on this basis, it can be inferred that the profitability of Indian banks follows a similar trend and the banks are similar on the basis of their profit-earning capacity across the ownership patterns of banks. Bank size which is measured by the variable LNTA and market share of a bank denoted by MS, have standard deviations of 1.31 and 1.92 respectively, which are highest among the independent variables. This highlights the fact that the Indian banks' size differs moderately based on their total assets but their market differs significantly, depending upon the ownership pattern. The mean of the variable NIM is 0.91 with a moderately low variance, which suggests that the spread between the interest earned and the interest expended by the Indian banks is not very high but follows a similar trend across the bank groups. Further, the variable NPATA, representing the asset quality or the level of bad loans held by a bank has a moderately high variance which denotes that the asset quality differs across the different bank groups.

The correlation matrix (presented in Table 4.4) explains the association between the dependent variable and the explanatory variables and it also shows the degree of correlation between the regressors themselves. It can be observed that the degree of correlation between the regressors is significantly low and is below 0.50 for all the variables. It proves that the explanatory variables in the model do not suffer from the problem of multicollinearity.

Table 4.3: Descriptive Statistics

	Obs.	Mean	St Dev.	Max	Min
ROA	450	0.91	0.54	2.02	-2.01
LNTA	450	13.46	1.31	16.83	9.18
NPATA	450	1.34	1.03	7.18	0.07
OXPTA	450	0.48	0.27	2.04	0.02
NIM	450	0.91	0.53	2.02	-1.84
HHI	450	2.57	0.19	4.03	2.15
MS	450	7.37	1.92	10.26	3.89

Source: Computed Results

Table 4.4: Correlation Matrix

	ROA	LNTA	NPATA	OXPTA	NIM	HHI	MS
ROA	1.0000						
LNTA	0.0873	1.0000					
NPATA	-0.7045	0.1131	1.0000				
OXPTA	-0.0741	-0.4286	0.0144	1.0000			
NIM	0.5275	-0.1869	-0.2730	0.2816	1.0000		
HHI	0.0085	-0.2568	-0.1083	0.1575	0.0341	1.0000	
MS	0.0448	0.3887	0.0538	-0.1318	-0.0619	-0.0014	1.0000

Source: Computed Results

Table 4.5: Results of Panel Data Models – ROA

Variable	Fixed Effects model		Random Effects Model	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNTA	0.07***	2.65	0.05**	2.58
NPATA	-0.25***	-20.38	-0.26***	-21.37
OXPTA	-5.82***	-10.54	-4.13***	-10.87
NIM	0.47***	15.34	0.47***	17.10
HHI	16.28**	2.43	10.76*	1.77
MS	-0.46	-0.17	-0.81	-0.72
C	-0.93	-1.40	-0.53	-0.98
Observations		450		450
F-Statistic		47.50		173.49
Prob (F-Statistic)		0.00		0.00
R ²		0.85		0.71
Durbin-Watson Stat		1.69		1.25
Hausman Test Stat		$\chi^2(6) = 12.80$		Prob > $\chi^2(0.04)$
Chosen Model		Fixed Effects Model		

Source: Computed Results

Note: ***, ** and * denote statistical significance of 1%, 5% and 10% respectively

After having done the preliminary analysis, the study moves forward with the estimation of the panel data model for determining the profitability of banks. The findings of the estimation model are illustrated in Table 4.5. The estimates have been run for both Fixed Effects Model (FEM) and Random Effects Model (REM). In both the models, F-Statistic is found to have significant probability values, which proves the efficiency of each model. Further, to choose between the models, Hausman Test is performed. The results of the Hausman Test show a χ^2 value of 12.80 with a probability of less than 5 percent, thus proving the alternative hypothesis of the test that FEM is the more appropriate model. Moreover, the R^2 value of the Fixed Effects Model is 0.85, which signifies a high degree of the explanatory power of the model. The model is also free from the problem of autocorrelation as the Durbin-Watson statistic has a value of 1.69, which sits in the relatively normal range i.e., within the prescribed range of 1.5 to 2.5 (Field, 2009).

Having chosen the FEM model, the study now delves into the analysis of coefficients of the explanatory variables. It can be observed that all the regressors, except MS show a statistically significant relationship with the dependent variable ROA. The variables LNTA, NPATA, SDATA, OXPTA, and NIM are statistically significant at 1 percent level while HHI is found to be significant at 5 percent. Further, the sign coefficients associated with the explanatory variables are all in line with the priori expectations, except in the case of MS which revealed a negative but statistically insignificant association with the dependent.

The empirical findings reveal that among the bank-specific factors, the size of the bank (LNTA) and the spread of net interest margin earned by the bank, have a positive association with the level of bank profitability. OXPTA, representing the

operating expenses incurred by a bank with respect to its total assets is found to have the highest effect among the bank-specific regressors and is found to have a negative effect on the profitability of banks. An increase in OXPTA by 1 percent would bring down the ROA or profitability level of a bank by 5.82 percent. Moreover, the asset quality (NPATA) of a bank measured by its holdings of bad loans reveal a negative relationship with its profitability level, with a moderately lower degree of influence. Further, among the market-specific determinants, the concentration in the market (HHI) is found to have a positive and a very high degree of impact on the bank profitability but at a lower level of statistical significance i.e., 5 percent level.

4.8. CONCLUSION

After having analysed the empirical results, it can be concluded that the profitability of Indian banks was significantly affected by both the bank-specific and the market-specific factors. The results of the empirical analysis reveal that all the factors, except for the market share of banks, considered in the model equation to determine the profitability of Indian banks are statistically significant and have a bearing on their ability to earn profits. Among the determinants, the effect of operating expenditure incurred by the banks and the concentration in the market had the highest impact on bank profitability.

The market concentration in the Indian banking industry remained fairly competitive as the HHI scores persisted below the 1500 mark and was also found to have a positive association with bank profitability which is in line with the priori expectation and provides evidence of improved profitability of banks if the industry consolidates into a fewer number of banks.

Market share of the banks classified by ownership pattern remained fairly consistent during the study period. The empirical results indicate a negative but a statistically insignificant association of market share with bank profitability. This is contrary to our priori expectation and may be attributed to the fact that the majority of market share in the Indian banking sector is held by the public sector banks which are plagued with the issue of lower profitability, thereby negating the impact of a higher market share held by them on their capacity to earn profits.

Further, among the bank-specific regressors, the level of operating expenses expended by the banks had the highest effect on its profitability level. A 1 percent increase in such expenses reduces profitability by more than 5 percent. Therefore, it becomes imperative for the banks to cut down on their level of operation cost in order to achieve higher levels of profitability.

Moreover, the quality of assets held by a bank measured by the proportion of impaired loans to the total advances was found to have a negative impact on its profitability. As the level of asset delinquency surges, it affects a bank's profitability in three ways, firstly it curtails the income received by the banks from its Interest-Based Sources. Secondly, the incremental rise in NPA levels requires the banks to make adjustments for necessary provisioning, which is a charge against its profits. Thirdly, due to statutory requirements, the banks have to maintain a higher capital adequacy level without which they are restricted from floating additional credit.

Lastly, the size of the bank and the spread of the net interest margin earned by a bank was found to have a positive effect on its profit earning capability. The effect of banks size on its profitability was found to be very low, while the impact of net interest

margin was found to be at a moderate level. Thus, the banks should focus on improving their level of efficiency with respect to the size of their banking operations.

On the basis of the empirical results, we can reject both our null hypotheses and accept the alternative hypotheses as we found significant evidences to support that the profitability of Indian banks was affected by both the bank-specific and Market specific determinants.

In the next chapter, we will continue with our discussion and analysis of the stability parameters of the Indian banking sector by examining the determinants of the credit risk of the Indian banks.

REFERENCES

- Acharya, V. V., & Kulkarni, N. (2012). What saved the Indian banking system: state ownership or state guarantees? *The World Economy*, 35(1), 19-31.
- Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2019). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics*, 24(1), 168-185.
- Alshatti, A. S. (2016). Determinants of banks' profitability—the case of Jordan. *Investment Management & Financial Innovations*, 13(1), 84.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, 18(2), 121-136.
- Baltagi, B.H. (1995). *Econometric analysis of panel data*. New York: John Wiley and Sons.
- Barua, R., Roy, M., & Raychaudhuri, A. (2016). Structure, conduct and performance analysis of Indian Commercial Banks. *South Asian Journal of Macroeconomics and Public Finance*, 5(2), 157-185.
- Bhattacharyya, A., Lovell, C. K., & Sahay, P. (1997). The impact of liberalization on the productive efficiency of Indian commercial banks. *European Journal of operational research*, 98(2), 332-345.
- Căpraru, B., & Ihnatov, I. (2015). Determinants of bank's profitability in EU15. *Annals of the Alexandru Ioan Cuza University-Economics*, 62(1), 93-101.
- Field, A.P. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* 3rd edition). London: Sage.
- Garcia, M. T. M., & Trindade, M. J. (2019). Determinants of banks' profitability in Angola. *African Journal of Economic and Management Studies*.
- Kawshala, H., & Panditharathna. K. (2017). The Factors Effecting on Bank Profitability. *International Journal of Scientific and Research Publications*, 7(2), 212-216.
- Kundid, A., Škrabić, B., & Ercegovac, R. (2011). Determinants of bank profitability in Croatia. *Croatian Operational Research Review*, 2(1), 168-182.
- Osuagwu, E. (2014). Determinants of bank profitability in Nigeria. *International Journal of Economics and Finance*, 6(12), 46-63.

- Rudhani, L. H., Ahmeti, S., & Rudhani, T. (2016). The Impact of Internal Factors on Bank Profitability in Kosovo. *Acta Universitatis Danubius. OEconomica*, (12 (1)), 95-107.
- Sanyal, P., & Shankar, R. (2011). Ownership, competition, and bank productivity: An analysis of Indian banking in the post-reform period. *International Review of Economics & Finance*, 20(2), 225-247.
- Seenaiyah, K., Rath, B. N., & Samantaraya, A. (2015). Determinants of bank profitability in the post-reform period: Evidence from India. *Global Business Review*, 16(5_suppl), 82S-92S.
- Singh, D. D. (2010). Bank specific and macroeconomic determinants of bank profitability: the Indian evidence. *Paradigm*, 14(1), 53-64.
- Wooldridge, M. (1999). *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.

Chapter - 5
Determinants of Credit Risk

CHAPTER - 5

DETERMINANTS OF CREDIT RISK

5.1. INTRODUCTION

In the previous chapter, we discussed and analysed the various determinants, both bank-specific and industry-specific factors that affect a bank's profitability and thereby also its performance. Now we will delve into the analysis of stability parameters of Indian banks by first analysing the credit risk determinants in this present chapter and the determinants of liquidity risk in the subsequent chapter.

The present chapter examines the factors that affect the credit risk in Indian banks by analysing the bank-specific and macroeconomic determinants that influence a bank's asset delinquency rate.

5.2. BACKGROUND

In modern economies, the banks predominantly engage themselves in risk management practices, since the economic ramifications of a bank failure can be devastating for the entire financial system. However, imprudent risk management practices overseeing credit policy had a critical role to play in the financial crisis of 2008 (Atikogullari, 2009; Thiagarajan *et al.*, 2011). Thus, paving the way for the regulators in framing more prudent credit risk and lending policies.

Credit risk as defined by the Basel Committee on Banking Supervision is the potential risk of default by borrowers while meeting their obligations in accordance with the agreed terms (Bank for International Settlements, 2005). These delinquent assets otherwise known as Non-Performing Assets (NPA), are directly associated with

the financial health of a bank and are a major influencing factor towards the credit riskiness of the banking sector. As these advances lent by the banks become delinquent or ceases to generate revenue, they become non-productive or non-performing assets. Historical evidence indicates that the majority of the failures in the banking industry can be directly linked with inadequate credit risk management (Jimenez & Saurina, 2006). Further, this issue of asset delinquency not only affects the banking system but also the entire economy as the bad loans pile up, it reduces the lending capacity of banks and thereby bringing down credit flow in the economy (Levine *et al.*, 2000).

Following the liberalization and deregulation of the Indian banking sector during 1994-1997 within the contours of the Narasimhan Committee recommendations, the Indian banks have achieved significant strides with regards to the management of delinquent assets. The most noticeable improvement can be witnessed in the case of Public Sector Banks (PSBs), where the delinquency rate dropped from 14 percent during 1990-04 to less than 3 percent in 2003. Similarly, the Private Banks also attained comparable success in this regard, following the policy changes brought in by the Reserve bank of India (RBI) (Thiagarajan *et al.*, 2011). However, as the Indian economy witnessed a secular upward trend in GDP growth during 2003 till 2011 throttled by an expansionary monetary policy and coupled by an aggressive credit push channelized through Public Sector Bank (PSB) lending (Samantaraya, 2016), the quality of assets held by these banks deteriorated. As most of this credit went into the funding of infrastructure projects, which were severely affected by the sub-prime crisis resulting in them becoming delinquent over time.

Thus, it becomes pertinent to study and explain the gradual surge in asset delinquency through determining the factors at large that affect the credit risk of Indian banks. The study intends to empirically analyse macroeconomic and bank-specific

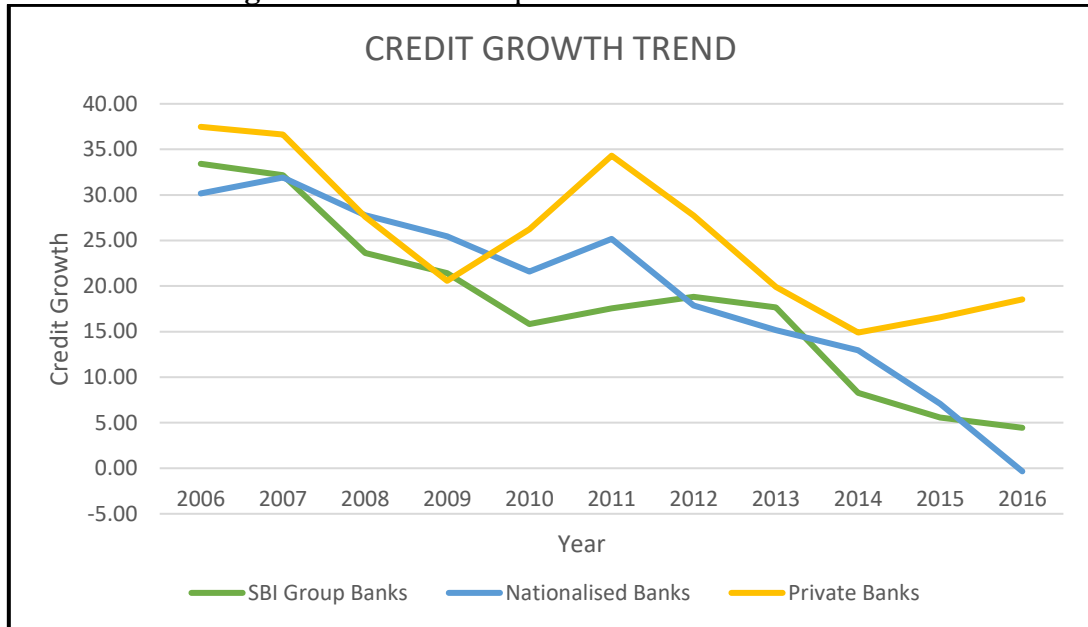
factors with a special focus on exploring the effect of excessive credit growth in the past, through studying the impact of lagged credit growth on the overall credit risk of the Indian banking sector.

5.3. CREDIT GROWTH AND ASSET DELINQUENCY TRENDS

From the figure 5.1 which depicts the bank group-wise growth in credit for the period FY 2005-06 to FY 2006-17, it can be observed that nationalised banks and the SBI group banks follow a very similar trend in the growth of their credit. Whereas, the private sector banks' credit growth trend follows a divergent path but is reflective of the prevailing economic cycles. During the financial crisis of 2008, it can be clearly seen that the growth in credit took a deep plunge in the case of private sector banks due to drying up of liquidity in those banks as people started moving their deposits to the SBI group banks and the nationalised banks (Acharya & Kulkarni, 2012). After the effects of the crisis subsided and the economy started gaining growth momentum from FY 2009-10 onwards, the private sector banks also started posting upward growth in their credit flows.

But on the other hand, The SBI group banks and the nationalised banks posted a higher level of credit growth than the Private Sector Banks from FY 2006-07 to FY 2009-10, and even during the crisis years of 2008 and 2009. This higher growth in credit was mainly fuelled by the expansionary credit policy adopted by the Government of India which channeled the funds from public sector banks to fund various infrastructure projects (Samantaraya, 2016). From FY 2012-13 onwards we can see a secular fall in the rate of credit growth of public sector banks as their credit lending ability is severely impaired by the accumulation of loans that turned out to be delinquent.

Figure 5.1: Bank Group-Wise Credit Growth Trend

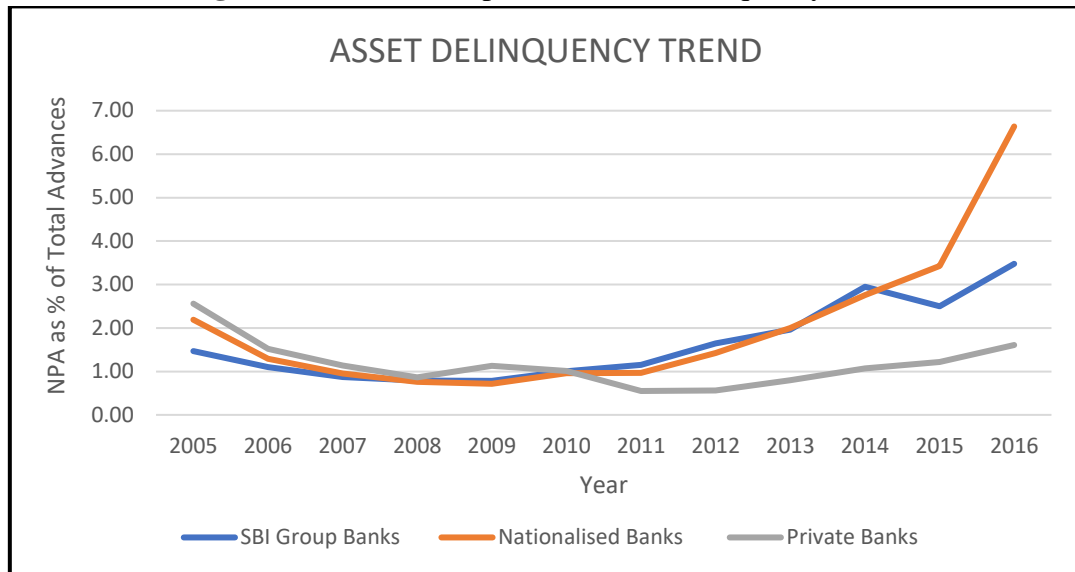


Source: Computed Figure

By examining the trend of asset delinquency among the private sector banks and the public sector illustrated in the figure 5.2 it can be observed that from FY 2005-06 to FY 2010-11, both followed a similar trend with SBI group banks posting lower level of bad loans among the public sector banks. But from FY 2011-12 onwards the bad loans started to pile up in the public sector banks which were a result of excessive growth in credit during the economic boom periods and started turning out to be delinquent with the passage of time (Samantaraya, 2016).

The situation of asset delinquency started getting worse for the public sector banks from FY 2014-15 onwards as the NPAs of both SBI group banks and nationalised banks crossed 3 percent. The net NPA level of nationalised banks even reached a 7 percent level in FY 2016-17. This sharp rise in the level of bad loans in public sector banks especially the nationalised banks can be attributed to the exercise of asset quality review brought in by the RBI which unearthed a large amount of substandard and bad loans which were earlier kept on restructuring process for years by the public sector banks and these loans from escaped classification as delinquent loans.

Figure 5.2: Bank Group-Wise Asset Delinquency Trend



Source: Computed Figure

5.4. VARIABLES USED IN THE PAST STUDIES

Several studies have been carried out globally on the credit risk of banks, of which the prominent ones include Makri *et al.* (2014), Nikolaidou and Vogiazas (2014), who studied the credit risk of European banks, whereas Ahmad and Ariff (2008) did a comparative study of credit risk determinants of banks from emerging and developed economies. The other prominent literature on the credit risk of banks includes studies from South East European countries such as Italy, Greece, and Spain (Louzis *et al.* 2012), (Messai and Jouini 2013), and from Tunisia (Abid *et al.* 2014). Misra and Dhal (2010), Thiagarajan *et al.* (2011), and Samantaraya (2016) studied the factors affecting asset delinquency of the banks in India. From examining these studies and a survey of other relevant literature pertaining to bank credit risk it can be summed up that asset delinquency of banks is a function of both internal and external factors. The internal factors are bank-specific whereas the external factors are macroeconomic determinants that are bank irrelevant. The bank-specific factors include bank size, credit growth, profitability, priority sector lending rate, asset reconstruction, and capitalization rate.

While the inflation rate, GDP growth, and unemployment rate constitute the macroeconomic determinants.

5.4.1. Bank-Specific Determinants

Bank size, the rate of priority sector lending, and the profitability level of banks have been found to have a negative association with bank credit risk. Makri *et al.* (2014), Nikolaidou and Vogiazas (2014), and Morina (2020) found that the size of a bank in terms of total assets has a significant bearing on the amount of bad loans the bank holds. They observed that size of the bank was negatively related to the credit risk of banks. Further, the profitability level of a bank influences its credit risk parameter and it has been found to have a negative relationship with the latter, which was reinforced by the findings of Louzis *et al.* (2012) and Messai and Jouini (2013). Moreover, the proportion of priority sector of the total advances of the bank also reduces the probability of its loans from turning delinquent. Misra and Dhal (2010) and Bardhan and Mukherjee (2016) found evidence to support the negative association of priority sector lending on the bank's asset quality. However, Samantaraya (2016) found a positive relationship between priority sector lending and the stock of restructured assets held by Indian banks.

The bank-specific factors that were found to have a positive association with a bank's asset delinquency rate include credit growth, asset restructuring, and accumulated past bad loans. Thiagarajan *et al.* (2011), Messai and Jouini (2013), and Samantaraya (2016) found that credit growth or the rate of growth of the loans issued by a bank has a positive effect on the rate of its asset delinquency. Further, the practice of loan evergreening or asset restructuring also increases the stockpile of bad loans of a bank. Messai and Jouini (2013), Bardhan and Mukherjee (2016) and Samantaraya (2016) found in their studies the assets that were once restructured had a higher possibility of turning delinquent, which added to the overall credit risk of the bank.

However, in most of the studies, the lagged effect of asset restructuring was studied. While some studies found the practice of asset restructuring can also have a negative effect on the delinquency rates of loans in a bank as they tend to reduce the actual amount of doubtful assets by converting them into standard assets (Misra and Dhal, 2010). A very similar effect was also observed by Makri *et al.* (2014), Nikolaidou and Vogiazas (2014) in their study of Eurozone banks, where they found that the accumulated bad loans from the previous periods had a positive effect on the credit risk of banks.

5.4.2. Macroeconomic Determinants

The macroeconomic factors that were found to influence the asset delinquency rate of banks, comprised of the rate of inflation, the growth rate of GDP, and even to some extent the rate of unemployment. The rate of inflation and the rate of unemployment in an economy was found to have a positive relationship with the credit risk of banks. Messai and Jouini (2013), Abid *et al.* (2014), and Makri *et al.* (2014) found that the prevailing unemployment rate of a country increases the chances of loans issued by banks to turn delinquent and thus increasing its credit risk. Messai and Jouini (2013) and Nikolaidou and Vogiazas (2014) found that the rate of inflation had a positive but statistically insignificant effect on a bank's asset quality.

The growth rate of GDP was found to have a differing effect on the credit risk of banks in different regions of banks studied in the extant literature. The studies, that found to have a positive and statistically significant association of GDP growth or economic cycles on bank credit risk include those of Louzis *et al.* (2012) and Makri *et al.* (2014). A majority of studies including those of Messai and Jouini (2013), Abid *et al.* (2014), Samantaraya (2016), and Morina (2020) found that the asset delinquency

rate of a bank was negatively associated with the growth rate of GDP as during economic booms the borrowers were at a better position to pay back their loans.

5.5. OBJECTIVES, RATIONALE AND HYPOTHESES

The present chapter has two primary objectives, the first objective is to identify the major determinants of credit risk in the Indian banking sector with a special focus on the various bank-specific and macroeconomic factors that affect the asset delinquency rate of the Indian banks as identified while reviewing existing literature on bank credit risk. The second objective set for this chapter is to analyse the effect of excessive credit growth in the preceding years on the rate of asset delinquency in Indian commercial banks.

The Foreign banks operating in India are not considered in the study for three main reasons, one being the fact that the preliminary analysis of the trend of credit growth of these banks in the period of the study revealed that these banks exhibit a very divergent trend of growth in their credit outlay. Secondly, the foreign banks operating in India do not indulge much in credit lending activities rather they facilitate forex transactions and other wholesale banking activities, which explains their negligible share in holdings of bad loans in the Indian banking sector. Thirdly, the regressors to be used in the estimation model such as priority sector lending, the effect of lagged credit growth, and the impact of asset restructuring do not affect the asset quality and thereby the asset delinquency of the foreign banks in India. Therefore, estimating the foreign bank's credit risk through the said regressors in the model would yield erroneous results. Moreover, the choice of a panel data framework over other econometric models is done to factor in the cross-section effect of each bank in the panel observed over the period of study.

Before proceeding to the development of the empirical model for our study we have set the following null hypotheses for our study which we will test through our empirical models: -

H₀₁ = There is no effect of Bank-Specific Variables on bank Credit Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Credit Risk.

Similarly, the alternative hypotheses set for our study are set as the following: -

H_{a1} = There is an effect of Bank-Specific Variables on bank Credit Risk.

H_{a2} = There is an effect of Macroeconomic Variables on bank Credit Risk.

5.6. EMPIRICAL MODEL

5.6.1. Measurement of Variables

Asset delinquency or credit risk in the banking sector can be measured through various ratios such as Net NPAs over Total Advances, Gross NPAs over Total Advances, Sub-Standard Advances over Gross NPAs and Restructured Standard Advances over Standard Advances. After an extensive review of relevant literature, it has been observed that there is a unanimous agreement among researchers over the use of Net NPAs over Total Advances as a proxy for measuring the bank credit risk and it is represented in this study by the variable NPATA. Therefore, NPATA is the dependent variable used in the model for estimation of Credit Risk and its determinants.

Further, appropriate variables that are expected to influence the Credit Risk of banks have been selected after a thorough examination of the existing literature and keeping in view the dynamics of the Indian banking sector. Moreover, the explanatory variables are grouped into Bank-Specific variables and Macroeconomic variables.

Among the Bank-Specific variables, Bank Size is an important determinant of bank credit risk which is calculated by taking the natural logarithm of the total assets of a bank and is expected to have a negative effect as larger banks indulge in businesses other than traditional lending operations thus reducing their exposure to delinquent lending. Further, profitability is expected to have both a positive or a negative effect on asset delinquency of banks, and in this study, it is measured by ROA (Return on Assets) which is a widely used indicator of bank profitability. It is calculated as the percentage of net profit earned by a bank divided by the total assets of the bank.

Other variables that are expected to influence the asset delinquency of a bank include the lagged credit growth and accumulated bad loans. Both the variables are bank-specific and are expected to have a positive relationship with the bank credit Risk. In this study, the effect of excessive credit growth is represented by the variable LDCG (lagged credit growth) computed by taking a progressively weighted average of five year's credit growth of a bank comprising of the current year and preceding four years with higher weights been assigned to the farthest year and lowest to the most recent year. The years are weighted progressively at 0.25, 0.20, 0.15, 0.10, 0.05 respectively. The rationale behind such a technique is that the effect of past credit growth is deferred over subsequent years and over time contributes to non-performing assets. Whereas the effect of accumulated bad loans is captured by the variable lagged NPA which is calculated by taking the one-period lag of the non-performing assets of the bank.

The explanatory variables which are expected to have a negative effect on the credit risk of a bank include priority sector lending and asset restructuring. The priority sector lending is defined as the ratio of the priority sector loans over total advances. In the present study, it is symbolized as PRSLTA. Asset restructuring is represented by

the variable Restructured Standard Assets and is calculated by the ratio of standard restructured assets over total advances.

The macroeconomic determinant in the model comprises of the GDP growth rate which indicates of the changes in the Economic cycles. The rate of GDP growth considered in the study is the nominal growth in gross domestic product and is measured at current prices. The effect of the growth rate of GDP on bank credit risk is not defined at this stage and can have both a positive or a negative effect. The variable notation GDP is used to represent the growth of the gross domestic product. Table 5.1. gives a summary of the description and measurement of the variables used in the model and the expected relationship between the regressors and the dependent variable.

5.6.2. Data and Sample

The study is conducted in a panel data framework consisting of 45 banks as cross-section units observed over a period of 10 years from FY 2005-06 to FY 2014-15, with 450 bank-year observations. The present study confines to the Indian banks only, comprising of the nationalised banks, the SBI group banks, and the private banks operating in India. Data pertaining to the bank-specific variables such as bank size, credit growth, profitability, priority sector lending, asset restructuring, and asset quality has been extracted from various RBI publications such as Reports on Trend and progress of Banking in India, Basic Statistical Returns of SCBs in India and Statistical Tables Relating to Banks in India. The macroeconomic data pertaining to the growth rate of gross domestic product which represents the economic cycles has been extracted from RBI's Handbook of Statistics on Indian Economy.

Table 5.1: Summary of Variables, Measurement and Expected Relationship

Dependent Variable	Proxy	Measurement	
Asset Delinquency	NPATA	Net Non-Performing Assets/Total Advances	
Independent Variable	Proxy	Measurement	Expected Sign
Bank Size	$LNTA_{it}$	Log of total Assets	–
Lagged Credit Growth	$LDCG_{it}$	Five Years Weighted Lag of Credit Growth (Growth Rate of Total Advances)	+
Priority-Sector Lending	$PRSLTA_{it}$	Ratio of (Priority Sector Loans)/ (Total Advances)	–
Restructured Standard Assets	$SDATA_{it}$	Ratio of (Standard Restructured Assets) / (Total Advances)	–
Return on Assets	ROA_{it}	100*(Net Profit)/ (Total Assets)	+/-
Lagged NPA	$LNPA_{it-1}$	One period lagged LNPA	+
Economic Cycle	GDP_t	GDP Growth Rate	+/-

Source: Based on Priori Information

5.6.3. Methodology

The present study analyses the determinants of asset delinquency of Indian banks using a panel data model. The choice of using a panel-data regression model over a pooled OLS model is done to account for the bank-specific effect or the cross-section heterogeneity and to enhance the robustness of the estimates by increasing the number of observations (Wooldridge, 1999). Algebraically, the panel data regression model is represented in the equation (1):

$$NPATA_{it} = \alpha + \beta_1 LNTA_{it} + \beta_2 LDCG_{it} + \beta_3 PRSLTA_{it} + \beta_4 SDATA_{it} + \beta_5 ROA_{it} + \beta_6 LNPA_{it-1} + \beta_7 GDP_t + u_i + \epsilon_{it} \quad (1)$$

where $NPATA$ is the dependent variable that measures the asset delinquency rate of banks, it is measured as a natural log of non-performing assets. $LNTA$ or natural log of total assets absorbs the bank size effect. $LDCG$ represents the effect of excessive past credit growth $PRSLTA$ and $SDATA$ indicate the effect of priority sector lending and asset restructuring respectively. Both are expected to have a negative effect as priority sector loans are mostly backed by the government or are comprised of retail loans which

have lower delinquency rate, similarly, restructuring of assets transforms the doubtful loans into standard assets thereby reducing NPAs. Profitability (*ROA*) and economic cycles (*GDP*) can have both negative and positive relationship depending on the bank's practices. Lastly, the previous year's NPA level ($LNPA_{it-1}$) or *LGILNPA* also contributes to the current year's NPA levels and thus has a positive effect.

The symbols α and β denote the intercept and the slope coefficient of the explanatory variables, u_i is the unobserved bank-specific effect and ϵ_{it} is the error term that is independently and identically distributed among the banks and years. There exists a divergence of opinion among econometricians regarding the treatment of the cross-section effect term u_i , and hence in the choice of the appropriate model between fixed effects (FE) and random effects (RE) models (Baltagi, 1995). Therefore, in the present study, Hausman test is used to choose between FE and RE.

5.7. RESULTS AND DISCUSSION

Before proceeding with the estimation model, a preliminary analysis of descriptive statistics (illustrated in Table 5.2.) is undertaken at this stage. NPATA, the dependent variable in the model has a standard deviation of 0.19 which is within a normal range, without excess variation, and on this basis, it can be inferred that the credit Risk of Indian banks follow a similar trend and are similar on the basis of their credit risk standing across the ownership patterns of banks. Bank size which is measured by the variable LNTA has the highest standard deviation among the variables, which highlights the fact that the Indian banks' size differs moderately based on their total assets. The mean of the variable ROA is 0.91 with a low variance, which suggests that the profitability level of Indian banks is low but similar across the banks. SDATA also

reveals a lower degree of variance, which proves that the asset restructuring practices are common across the different bank groups.

The correlation matrix (presented in Table 5.3) explains the association between the dependent variable and the explanatory variables and it also shows the degree of correlation between the regressors themselves. It can be observed that the degree of correlation between the regressors is significantly low and is below 0.50 for all the variables. It proves that the explanatory variables in the model do not suffer from the problem of multicollinearity.

Table 5.2: Descriptive Statistics

	Obs.	Mean	St Dev.	Max	Min
NPATA	450	2.57	0.19	4.03	2.15
LNTA	450	13.56	1.29	16.83	9.34
LDCG	450	0.15	0.07	0.54	0.01
SDATA	450	0.48	0.27	2.04	0.02
ROA	450	0.91	0.53	2.02	-1.84
LGINPA	450	2.57	0.19	4.03	2.15
PRSLTA	450	0.32	0.05	0.49	0.14
GDP	450	7.37	1.92	10.26	3.89

Source: Computed Results

Table 5.3: Correlation Matrix

	NPATA	LNTA	LDCG	PRSLTA	SDATA	ROA	LGINPA	GDP
NPATA	1.0000							
LNTA	-0.2375	1.0000						
LDCG	0.1281	0.1766	1.0000					
PRSLTA	-0.0615	-0.2192	0.2469	1.0000				
SDATA	0.1403	0.2516	0.4351	-0.4851	1.0000			
ROA	0.4641	0.0475	0.0764	-0.0112	0.0674	1.0000		
LGLNPA	0.7754	-0.1491	0.2373	-0.1585	0.2794	0.4554	1.0000	
GDP	0.0213	-0.0552	0.0002	0.1117	-0.0404	-0.0572	-0.0455	1.0000

Source: Computed Results

After having done the preliminary analysis, the study moves forward with the estimation of the panel data model for determining the Credit Risk of banks. The findings of the estimation model are illustrated in Table 5.4. The estimates have been run for both Fixed Effects Model (FEM) and Random Effects Model (REM). In both the models, F-Statistic is found to have significant probability values, which proves the efficiency of each model. Further, to choose between the models, Hausman Test is performed. The results of the Hausman Test show a χ^2 value of 152.38 with a probability of less than 5 percent, thus proving the alternative hypothesis of the test that FEM is the more appropriate model. Moreover, the R^2 value of the Fixed Effects Model is 0.76, which signifies a high degree of the explanatory power of the model. The model is also free from the problem of autocorrelation as the Durbin-Watson statistic sits in the relatively normal range i.e., within the prescribed range of 1.5 to 2.5 (Field, 2009).

Table 5.4: Results of Panel Data Models – NPATA

Variable	Fixed Effects model		Random Effects Model	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNTA	-0.07***	-4.77	-0.02***	-5.01
LDCG	1.89***	5.00	0.66**	1.96
PRSLTA	-0.60**	-2.52	-0.46**	-2.37
SDATA	-0.55***	-4.78	-0.22**	-2.23
ROA	0.04***	3.06	0.06***	5.28
LG1 LNPA	0.38***	8.47	0.69***	20.82
GDP	0.01	0.23	0.03**	2.03
C	2.76	10.04	1.19	7.85
Observations		387		387
F-Statistic		21.78		98.06
Prob (F-Statistic)		0.00		0.00
R ²		0.76		0.64
Durbin-Watson Stat		1.91		1.84
Hausman Test Stat		$\chi^2(7) = 152.38$ Prob > $\chi^2(0.00)$		
Chosen Model		Fixed Effects Model		

Source: Computed Results

Note: ***, ** and * denote statistical significance of 1%, 5% and 10% respectively

Having chosen the FEM model, the study now delves into the analysis of coefficients of the explanatory variables. It can be observed that all the regressors, except GDP, show a statistically significant relationship with the dependent variable NPATA. The variables LNTA, LDCG, SDATA, ROA, and LG1NPA are statistically significant at 1 percent level while PRSLTA is found to be significant at 5 percent. Further, the sign coefficients associated with the explanatory variables are all in line with the priori expectations.

The empirical findings reveal that among the bank-specific factors Lagged Credit Growth (LDCG), Profitability (ROA), and one period lagged NPA (LG1LNPA) have a positive association with the rate of asset delinquency. LDCG is found to have the highest effect among all the regressors and a 1 percent increase in LDCG would soar up the NPAs of a bank by 1.89 percent. The effect of one period lagged NPA is observed to be moderate and that of profitability to be significantly low. Moreover, priority sector lending (PRSLTA) and asset restructuring (SDATA) reveal a negative relationship with NPAs with a moderately higher degree of influence. Further, the size of a bank has a negative but at a very lower degree of impact. Finally, economic cycles (GDP) are observed to have a positive but statistically insignificant effect on a bank's NPA.

5.8. CONCLUSION

After having analysed the empirical results, it can be concluded that the asset quality of Indian banks was largely affected by their credit policy. The results of the empirical analysis reveal that all the factors considered in the model equation to determine the credit risk of Indian banks are statistically significant and have a bearing on their level of asset delinquency. Among the determinants effect of excessive credit growth had the highest impact on bank credit risk. As it is evident from the findings that expansionary

lending practices during the periods of economic boom led to excessive credit growth among the banks which in the later periods resulted in higher incidences of asset delinquency.

From the results, we can observe that the variable asset restructuring has a negative and statistically significant association with the level of delinquent assets held by a bank. This can be attributed to the unsound practice of asset restructuring and evergreening of loans followed by the Indian banks in order to escape from the brunt of additional provisioning. This led to stockpiling of substandard and loss assets over a period of time, which is in fact a matter of concern as these substandard loans are kept on being restructured into standard assets, it will be catastrophic for the banks if these assets are not written off in time.

Further, the priority sector lending had a significant negative effect on the credit risk of the Indian banks. Contrary to the general belief, these loans do not contribute much to the asset delinquency or the level of NPAs of Indian banks, rather it has a negative association primarily because most of these advances are retail loans or farm loans which are in receipt of government waivers. The profitability and the size of the banks had a very low impact on the asset quality of Indian banks; thus, the credit policy of the banks should be framed independently from the influence of its profit earning capability or the size of the bank's total assets.

Moreover, the effect of accumulated bad loans and the macroeconomic factor are found to be positively associated with the credit risk of banks. The lagged NPAs or the accumulated bad loans impaired the credit lending ability of Indian banks from issuing fresh loans and in turn led to higher incidences of delinquent assets to

accumulate over time. Lastly, the growth rate of GDP representing the effect of economic cycles did not have any impact on the credit lending policy of banks in India.

On the basis of the empirical results, we can reject both our null hypotheses and accept the alternative hypotheses as we found significant evidence of Asset delinquency of Indian banks was affected by both the bank-specific and macroeconomic determinants of bank credit risk.

In the next chapter, we will continue with our discussion and analysis of the stability parameters of the Indian banking sector by examining the determinants of liquidity risk of the Indian banks.

REFERENCES

- Abid, L., Ouertani, M. N., & Zouari-Ghorbel, S. (2014). Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*, 13, 58-68.
- Acharya, V. V., & Kulkarni, N. (2012). What saved the Indian banking system: state ownership or state guarantees? *The World Economy*, 35(1), 19-31.
- Ahmad, N. H., & Ariff, M. (2008). Multi-country study of bank credit risk determinants. *International Journal of banking and Finance*, 5(1), 135-152.
- Atikogullari, M. (2009). An analysis of the Northern Cyprus banking sector in the post-2001 period through the CAMELS approach. *International Research Journal of Finance and Economics*, 32(10), 212-229.
- Baltagi, B.H. (1995). *Econometric analysis of panel data*. New York: John Wiley and Sons.
- Bank for International Settlements (2005). Sound Credit Risk Assessment and Valuation for Loans. Retrieved from <https://www.bis.org/publ/bcbs126.pdf>
- Bardhan, S., & Mukherjee, V. (2016). Bank-specific determinants of nonperforming assets of Indian banks. *International Economics and Economic Policy*, 13(3), 483-498.
- Field, A.P. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* 3rd edition). London: Sage.
- Jiminez.G. and J., Saurina, 2006. Credit cycles, credit risk and prudential regulation. *International Journal of Central Banking* 2(2): 65-98.
- Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1), 31-77.
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, 36(4), 1012- 1027.
- Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, 61(2), 193-206.
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International journal of economics and financial issues*, 3(4), 852-860.

- Misra, B. M., & Dhal, S. (2010). Pro-cyclical management of banks' non-performing loans by the Indian public sector banks. *BIS Asian Research Papers*, 16, 1-23.
- Morina, D. (2020). Determinants of Credit Risk in Commercial Banks of Kosovo. *International Journal of Economics & Business Administration (IJEBA)*, 8(2), 179-190.
- Nikolaidou, E., & Vogiazas, S. D. (2014). Credit risk determinants for the Bulgarian banking system. *International Advances in Economic Research*, 20(1), 87-102.
- Samantaraya, A. (2016). Procyclical credit growth and bank NPAs. *Economic and Political Weekly*, 51(12), 112-119.
- Thiagarajan, S., Ayyappan, S., & Ramachandran, A. (2011). Credit risk determinants of public and private sector banks in India. *European Journal of Economics, Finance and Administrative Sciences*, 34(34), 147-153.
- Wooldridge, M. (1999). *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.

Chapter - 6

Determinants of Liquidity Risk

CHAPTER - 6

DETERMINANTS OF LIQUIDITY RISK

6.1. INTRODUCTION

Continuing with our discussion of stability parameters of Indian commercial banks from the previous chapter where we discussed and analysed the various determinants, both bank-specific and macroeconomic factors that affect a bank's credit risk and thus influence the quality of assets it holds. In this present chapter, we will examine the factors that affect the liquidity risk parameter of stability of Indian commercial banks by analysing the bank-specific and macroeconomic determinants that influence a bank's holding of liquidity buffer.

The chapter is structured as follows: the second section provides a brief background to the concept of liquidity risk in Indian banks while the third section presents the liquidity trend of banks operating in India followed by the fourth section which delves into reviewing the variables used in the existing literature and the fifth section highlights the objectives, rationale, and hypotheses of the present chapter. The sixth section discusses about the data and methodology incorporated in the study and the seventh section focuses on the discussion and analysis of the empirical results. Subsequently, the eighth and the final section offers conclusions drawn from the analysis.

6.2. BACKGROUND

As banks have become one of the most vital components of any financial system, ensuring the stability of the banking sector has gained significant importance as a policy

initiative worldwide. Banking stability as an economic indicator can be used to determine whether an economy is robust enough to withstand both the internal and external shocks. Banking stability in itself is a function of several health parameters of individual banks, e.g., asset quality, liquidity risk, capital adequacy, performance, etc. (Reserve Bank of India, 2013). Among the banking stability parameters, discussions and research on the liquidity risk component have gathered momentum following the aftermath of the financial crisis of 2008, during which the banks were faced with severe liquidity crunch (Vodova, 2011; Choon, Hooi, Murthi, Yi & Shven, 2013). Moreover, the Basel Committee on banking supervision emphasized that the stability of a commercial bank depends on its liquidity position and effective liquidity risk management (Bank for International Settlements, 2009).

Liquidity in the context of banking may be explained as the capacity of a bank to fund asset growth and meet both expected and unexpected cash and collateral obligations at a reasonable cost and without incurring unacceptable losses (BIS, 2008). Liquidity risk is the bank's inability to meet such obligations as they become due, without adversely affecting the bank's financial condition (RBI, 2012). Effective liquidity risk management helps in ensuring a bank's ability to meet its obligations as they become due and reduces the probability of a liquidity crisis. This further assumes significance on account of the fact that a liquidity crisis, in the banking sector can have grave systemic implications in emerging economies, where banks act as a predominant financial intermediary.

The Indian banking sector has traditionally been resilient to the shocks in the global banking system since it is not fully integrated with the global financial markets. But the financial crisis of 2008 unearthed the hidden fissures in the Indian banking

system when the Private banks witnessed an unprecedented plunge in their liquidity reserves solely due to the shift of consumer deposits to the state-owned bank groups, based only on the consumer perception and not because of their financial health (Acharya & Kulkarni, 2012). Likewise, the foreign banks, that generally maintained the highest level of liquidity holdings also saw a significant decline, since their parent organisations were themselves reeling under the influence of the crisis as they had huge exposure to the subprime products. On the other hand, the state-owned banks i.e., the State Bank of India (SBI) group banks and the Nationalized banks remained relatively immune to the adverse effects of the crisis as they have been stringently following all the statutory requirements and also because of the consumers' perception that the government would bail them out in case of a bank-run.

Although the banks in India have been prudent enough in maintaining their liquidity reserves by strictly adhering to the guidelines issued by the Reserve Bank, there exists a significant dearth of research on liquidity risk management and more specifically on the factors that affect bank liquidity in India. Therefore, it becomes pertinent to identify the determinants of liquidity risk in the Indian banking sector, which would be quintessential in charting out future policies to improve its overall efficacy.

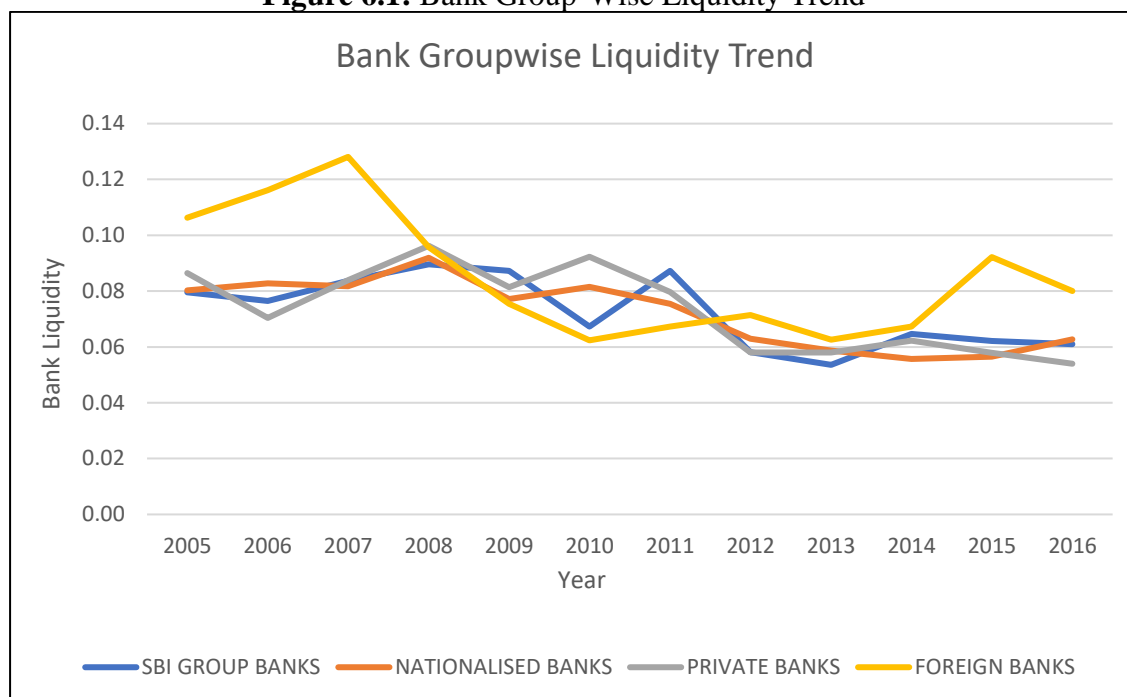
In order to assess the major implications of liquidity risk management on various banking groups operating in India, the present chapter seeks to empirically examine the macroeconomic and bank-specific factors that affect the liquidity risk of the Indian banking sector using the data from Financial Year (FY) 2005-06 to 2014-15.

6.3. LIQUIDITY TREND OF BANKS IN INDIA

The Group-wise (SBI group banks, Nationalized banks, Private banks, Foreign banks) liquidity trend of banks operating in India from FY 2005 to 2016 is illustrated in Figure. 6.1. It can be observed that since FY 2005, foreign banks have been maintaining a significantly higher level of liquidity as compared to their Indian counterparts until the second half of FY 2007 (when the effects of the financial crisis started to kick in) and started to build up its liquidity reserves from FY 2010 onwards (when the effect of the crisis started to fade off). This is contrary to the practice of transnational banks (foreign banks) that hold lower liquidity reserves than the local banks at normal times, and in times of aggregate liquidity shortage, they tend to increase their liquid reserves relative to the local banks (Dinger, 2009).

The liquidity trend of the Indian banks throughout the period of study (FY 2005-2016) followed a similar pattern. Among the Indian banks, the private sector banks on average maintained a higher level of liquidity buffer than the public sector banks. And among the public sector banks, it can be seen that the SBI group banks maintained higher liquidity than the nationalised banks. During the crisis, there was a significant shift of deposits from the Private Banks to the state-owned SBI group banks and the nationalized banks, as people perceived the public sector banks to be a safer place to park their savings. This can be observed from the liquidity trend of the private sector banks that saw a sharp decline during the period of the financial crisis (Acharya & Kulkarni, 2012). Post-crisis, it can be observed that the private banks have been holding the highest level of liquidity among the Indian banks, further among the state-owned banks the SBI group banks have maintained on an average higher liquidity than the nationalized banks.

Figure 6.1: Bank Group-Wise Liquidity Trend



Source: Computed Figure

6.4. VARIABLES USED IN PAST STUDIES

Several studies have been carried out globally on the liquidity risk of banks, of which the prominent ones include Munteanu (2012), Dinger (2009), Cucinelli (2013), and Vodova (2011) who studied the liquidity of European banks, whereas Parameswar *et al.* (2012) and Deléchat, Henao, Muthoora, and Vtyurina (2014) studied bank liquidity in Gulf Cooperation Council (GCC) countries and Central American countries respectively. The other prominent literature on liquidity risk of banks includes studies from South East Asian countries such as Malaysia and Indonesia (Choon *et al.*, 2013), (Sudirman, 2015) and of Tunisia (Moussa, 2015). Singh and Sharma (2016) studied the factors affecting the liquidity of the banks in India. From examining these studies and a survey of other relevant literature pertaining to bank liquidity it can be summed up that liquidity risk of banks is a function of both internal and external factors. The internal factors are bank-specific whereas the external factors are macroeconomic

determinants and are bank irrelevant. The bank-specific factors include bank size, deposit rate, profitability, cost of funds, asset quality, and capitalization rate. While the inflation rate, GDP growth, and crisis constitute the macroeconomic determinants.

6.4.1. Bank-Specific Determinants

Bank size, funding cost, asset quality, and the profitability level of banks have been found to have a negative association with bank liquidity risk. Dinger (2009), Vodova (2013), and Singh and Sharma (2016) found that the size of a bank in terms of total assets has a significant bearing on the amount of its liquidity holding. Similarly, Choon *et al.* (2013) and Delechat *et al.* (2014) observed that there was a significant and negative effect of bank size on its liquidity position. On the other hand, Cucinelli (2013) found a positive association between liquidity risk and the size of the bank. Further, the profitability level of a bank influences its liquidity risk parameter and it has been found to have a negative relationship with the latter (Delechat *et al.*, 2014; Sudirman, 2015). This has been reinforced by the findings of Moussa (2015)'s study of liquidity risk determinants of banks in Tunisia. However, Singh and Sharma (2016) found a positive effect of profitability on bank liquidity while exploring the factors affecting bank liquidity in Indian banks. Similarly, the negative correlation of funding cost with bank liquidity has been highlighted by Moussa (2015), Choon *et al.* (2013), and (Vodova, 2011) in their study of Tunisian, Malaysian, and Czech banks respectively while Dinger (2009) found a positive effect. The level of impaired loans over total advances held by a bank adversely affects its asset quality and even its overall income generation capacity, which in turn impacts its liquidity risk position (Delechat *et al.*, 2014). Sudirman (2015), Moussa (2015), and Vodova (2013) found a negative association between asset quality determined on the basis of impaired loans and the

liquidity risk of banks. Cucinelli (2013) found banks' liquidity in the Euro Zone was positively affected by the amount of provisioning for loan loss reserve.

A few studies have found that the Deposit rate of banks also has a significant effect on their liquidity reserve levels. Singh and Sharma (2016) observed that the level of deposits in a bank affected its liquidity risk. Similarly, Moussa (2015) found a positive but insignificant association, while Dinger (2009) found a negative relationship between the deposit rate and liquidity in European banks. Likewise, if a bank is adequately capitalized then it enhances its capacity to absorb affect any of the risk parameters of the bank (BIS, 2009). The studies on the liquidity risk of European banks unanimously provide evidence of a positive effect of capital adequacy on bank liquidity (Vodova, 2011 & 2013; Cucinelli, 2013; Dinger, 2009). Singh and Sharma (2016)'s findings of liquidity risk determinants also reinforce the findings of the studies on European banks, but the studies on the south east Asian banks advocates for a negative relationship (Sudirman, 2015; Choon *et al.*, 2013).

6.4.2. Macroeconomic Determinants

Among the macroeconomic factors that influence the liquidity reserve holdings of banks, the inflation rate, and the growth rate of GDP are some of the most significant determinants (Delechat *et al.*, 2014). Inflation can have both negative or positive impact on bank liquidity as various studies such as Vodova (2011) and Cucinelli (2013) observed a negative relationship while Sudirman (2015) and Singh and Sharma (2016) found a positive association. Munteanu (2012) in his study of liquidity risk of Romanian banks found that bank liquidity was negatively affected by inflation during the years 2002-2007 while it had a positive effect during the years 2008-2010. Similarly, the effect of GDP growth on bank liquidity risk can also vary depending on the nature of

the economy and the degree of financial intermediation role of the banking sector in the economy. In the majority of the studies pertaining to liquidity risk determinants of banks, it has been found that GDP growth rate has a positive effect on the level of liquidity holdings of a bank (Choon *et al.*, 2013; Sudirman, 2015; Moussa, 2015; Vodova, 2013). However, Dinger (2009) found a negative correlation in the European banks, and a similar relationship was observed by Singh and Sharma (2016) in the Indian banks.

After the advent of the financial crisis of 2008, the focus of academicians and researchers has now moved to the effect of financial crises on the stability of banks of which liquidity is an important constituent. Parameswar *et al.* (2012) studied the variation in bank liquidity in GCC countries during the financial crisis and found it to be a significant determinant. Further research by Choon *et al.* (2013) and Vodova (2013) established the negative impact of the crisis on liquidity and stability of banks as a whole.

6.5. OBJECTIVES, RATIONALE AND HYPOTHESES

The primary objective of the present chapter is to identify the major determinants of liquidity risk in the Indian banking sector with a special focus on the various bank-specific and macroeconomic factors that affect the liquidity holdings of the Indian banks as identified while reviewing existing literature on bank liquidity through a panel data analysis.

The Foreign banks operating in India are not considered in the study for two main reasons, one being the fact that the preliminary analysis of the liquidity trend of these banks in the period of the study exhibits an erratic behaviour in terms of their liquidity holding as observed in the earlier section and secondly the regressors to be

used in the estimation model such as deposit rate, funding cost, and asset quality do not significantly affect the variations in the liquidity reserves of the foreign banks in India. Therefore, estimating the foreign bank's liquidity through the said regression model would yield erroneous results. Moreover, the choice of a panel data framework over other econometric models is done to factor in the cross-section effect of each bank in the panel observed over the period of study.

Before proceeding to the development of the empirical model for our study we have set the following null hypotheses for our study which we will test through our empirical models: -

H₀₁ = There is no effect of Bank-Specific Variables on bank Liquidity Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Liquidity Risk.

Similarly, the alternative hypotheses set for our study are set as the following: -

H_{a1} = There is an effect of Bank-Specific Variables on bank Liquidity Risk.

H_{a2} = There is an effect of Macroeconomic Variables on bank Liquidity Risk.

6.6. EMPIRICAL MODEL

6.6.1. Measurement of Variables

Liquidity in the banking sector can be measured through various ratios such as Liquid Assets to Total Assets, Deposits to total assets, Deposits maturing within one year to Total Deposits, etc. After an extensive review of relevant literature, it has been observed that there is a unanimous agreement among researchers over the use of Liquid Assets to Total Assets ratio as a proxy for measuring the liquidity Risk of banks. In this study, LIQTA is used as a notation for the Liquid Assets to Total Assets ratio, which is a

summation of Cash in Hand, Balance with RBI, Balance with banks in India, and Money at Call and Short notice scaled by Total Assets. Therefore, LIQTA is the dependent variable used in the model for the estimation of liquidity risk and its determinants.

Further, appropriate variables that are expected to influence the Liquidity Risk of banks have been selected after a thorough examination of the existing literature and keeping in view the dynamics of the Indian banking sector. Moreover, the explanatory variables are grouped into Bank-Specific variables and Macroeconomic variables. Among the Bank-Specific variables, Bank Size is an important determinant of liquidity risk which is calculated by taking the natural logarithm of the total assets of a bank and is expected to have a negative correlation as it has been observed that the banks which are relatively bigger in size tend to maintain a lower level of liquidity reserves and vice versa. Similarly, profitability is also found to have a negative effect on the liquidity of banks, and in this study, it is measured by NIM (net interest margin) which is a widely used indicator of bank profitability. It is the difference between the total interest paid and the interest earned by a bank.

Other variables that are expected to influence the liquidity reserve of a bank include the rate of deposit and its capital adequacy position. Both the variables are bank-specific and are expected to have a positive relationship with Liquidity Risk. In this study, deposit rate is measured by the ratio of Deposits over Total Liabilities and is denoted as DTL whereas Capital adequacy ratio Tier-1, which mainly comprises of equity capital and retained earnings, is used as a proxy for capitalization level of the bank and is denoted by the variable CAR in the model equation.

The explanatory variables which are expected to have a negative effect on the liquidity risk in the study include funding cost and asset quality of a bank. The cost of funds is defined as the ratio of the total interest expended to average deposits and other borrowings. In the present study, it is symbolized as COF. The level of impaired loans reduces the quality of assets held by a bank and even curtails its income generation capacity thereby reducing its liquidity holdings. The asset quality of the banks is studied in the liquidity risk model by the proxy NPATA, which is a ratio of Net Non-Performing Assets over Total Advances.

The macroeconomic determinants in the model include inflation rate and GDP growth rate which are indicators of the general price level and the Economic cycles respectively. The rate of inflation considered in the study is calculated on the Consumer Price Index and the nominal GDP growth is measured at current prices. Inflation is expected to have a positive association with bank liquidity while the growth rate of GDP is expected to have a negative effect. The variable notations for Inflation and GDP growth are INF and GDP respectively. Table 6.1. gives a summary of the description and measurement variables used in the model and the expected relationship between the regressors and the dependent variable.

6.6.2. Data and Sample

The study is conducted in a panel data framework consisting of 45 banks as cross-section units observed over a period of 10 years from FY 2005-06 to FY 2014-15, with 450 bank-year observations. The present study confines to the Indian banks only, comprising of the nationalised banks, the SBI group banks, and the private banks operating in India. Data pertaining to the bank-specific variables such as bank size, deposit rate, profitability, cost of funds, capital adequacy and asset quality has been

extracted from various RBI publications such as Reports on Trend and progress of Banking in India, Basic Statistical Returns of SCBs in India and Statistical Tables Relating to Banks in India. Data on macroeconomic variables has been extracted from RBI's Handbook of Statistics on Indian Economy.

Table 6.1: Summary of Variables, Measurement and Expected Relationship

Dependent Variable	Proxy	Measurement	
Liquidity Risk	LIQTA	(Total Liquid Assets)/ (Total Assets)	
Independent Variable	Proxy	Measurement	Expected Sign
Bank Size	LNTA _{it}	Log of total Assets	–
Deposits	DTL _{it}	100*(Deposits)/ (Total Liabilities)	+
Profitability	NIM _{it}	100*(Interest Earned – Interest Expended)/Average (Total Asset)	–
Cost of funds	COF _{it}	100*(Interest Expended)/Average (Deposits + Borrowings)	–
Asset Quality	NPATA _{it}	Net (Non-Performing Assets)/ (Total Advances)	–
Capital Adequacy	CAR _{it}	One period lagged LNPA	+
Inflation	INF _t	CPI Inflation Rate	+
Economic Cycle	GDP _t	GDP Growth Rate (Current Prices)	+/-

Source: Based on Priori Information

6.6.3. Methodology

The present study analyses the determinants of Liquidity Risk of Indian banks using a panel data model. The choice of using a panel data model over a pooled OLS model is done to account for the bank-specific effect or the cross-section heterogeneity and also to enhance the robustness of the estimates by increasing the number of observations (Wooldridge, 1999). The use of panel data model for examining the key determinants of Liquidity Risk of Indian banks is a novel attempt made in this study Algebraically, the panel model is represented in the equation (1):

$$LIQTA_{it} = \alpha + \beta_1 LNTA_{it} + \beta_2 DTL_{it} + \beta_3 NIM_{it} + \beta_4 COF_{it} + \beta_5 NPATA_{it} + \beta_6 CAR_{it} + \beta_7 GDP_t + \beta_8 INF_t + u_i + \epsilon_{it} \quad (1)$$

where *LIQTA* is the dependent variable which measures the Liquidity risk of banks, *LNTA* absorbs the bank size effect, *DTL* and *NIM* are proxies for deposit rate and profitability, *COF* measures the funding cost in terms of interest paid by the bank on its deposit holdings and other borrowings, *NPATA* and *CAR* are the variables that ascertain the stability and financial health of the bank where the former is an indicator of asset quality and the later measure the capitalization rate of the bank. Further, *GDP* and *INF* measure the effect of macroeconomic conditions on bank Liquidity Risk such as economic cycles and the prevailing price level respectively.

The symbols α and β denote the intercept and the slope coefficient of the explanatory variables, u_i is the unobserved bank-specific effect and ϵ_{it} is the error term that is independently and identically distributed among the banks and years. There exists a divergence of opinion among econometricians regarding the treatment of the cross-section effect term u_i , and hence in the choice of the appropriate model between fixed effects (FE) and random effects (RE) models (Baltagi, 1995). Therefore, in the present study, Hausman test is used to choose between FE and RE. Further, to ensure normality in the dataset and to concise large data variation in some variable, all the variables used in the model have been log-transformed by tacking their natural logarithms. Hence, the notation of the variables is changed to *LLIQTA*, *LDTL*, *LNIM*, *LCOF*, *LNPATA*, *LCAR*, *LGDP*, and *LINF*. The notation of *LNTA* remains unchanged as it is already in log-form and no transformation has been applied to it.

6.7. RESULTS AND DISCUSSION

Before proceeding with the estimation model, a preliminary analysis of descriptive statistics (illustrated in Table 6.2.) is undertaken at this stage. *LIQTA*, the dependent

variable in the model has a standard deviation of 0.33 which is within a normal range, without excess variation, and on this basis, it can be inferred that the Liquidity Risk of Indian banks follow a similar trend. Bank size which is measured by the variable LNTA has the highest standard deviation among the variables, which highlights the fact that the Indian banks' size differs moderately based on their total assets. The mean of the variable NIM is 0.97 with a low variance, which suggests that the profitability level of Indian banks is low but similar across the banks. COF has the lowest variance among the variables which means the funding cost is similar in the Indian banks across the bank groups. Further, NPATA has a high degree of standard deviation at 0.97 with a range of -4.61 to 2.47, highlighting a high degree of asymmetry in the level of impaired loans among the bank groups.

The correlation matrix (presented in Table 6.3) explains the association between the dependent variable and the explanatory variables and it also shows the degree of correlation between the regressors themselves. It can be observed that the degree of correlation between the regressors is significantly low and is below 0.50 for all the variables. It proves that the explanatory variables in the model do not suffer from the problem of multicollinearity.

Table 6.2: Descriptive Statistics

	Obs.	Mean	St Dev.	Max	Min
LIQTA	450	-2.65	0.33	-1.11	-3.42
LNTA	450	13.43	1.34	16.93	9.07
DTL	450	4.40	0.13	4.52	2.92
NIM	450	0.97	0.29	1.72	-1.46
COF	450	1.83	0.17	2.18	1.27
NPATA	450	0.09	0.97	2.47	-4.61
CAR	450	2.24	0.29	4.02	1.58
INF	450	2.00	0.26	2.32	1.35
GDP	450	1.99	0.33	2.48	1.44

Source: Computed Results

Table 6.3: Correlation Matrix

	LIQTA	LNTA	DTL	NIM	NPATA	COF	CAR	INF	GDP
LIQTA	1.0000								
LNTA	-0.4429	1.0000							
DTL	0.1623	-0.1390	1.0000						
NIM	0.1576	-0.2192	0.2469	1.0000					
NPATA	-0.1589	0.0958	0.1620	-0.2569	1.0000				
COF	-0.3610	0.0760	-0.0339	-0.3192	0.0552	1.0000			
CAR	0.0941	-0.2581	-0.2882	0.3568	-0.3052	0.0803	1.0000		
INF	0.0911	0.0532	0.0256	-0.0662	-0.3782	0.2807	0.1220	1.0000	
GDP	0.0321	-0.1237	0.0126	0.0560	0.1164	-0.3648	-0.0561	-0.2271	1.0000

Source: Computed Results

After having done the preliminary analysis, the study moves forward with the estimation of the panel data model for determining the Liquidity Risk of banks. The results of the estimation model are presented in Table 6.4. The estimates are run for both Fixed Effects Model and Random Effects Model. Both the models have significant probability values for their F-Statistic, which proves the efficiency of each model. Further, to choose between the models, Hausman Test is performed. The results of the Hausman Test show a χ^2 value of 75.59 with a probability of less than 5 percent, thus proving the alternative hypothesis of the test that Fixed Effects Model is the more appropriate model. Moreover, the R^2 value of the Fixed Effects Model is 0.62, which signifies a high degree of the explanatory power of the model. The model is also free from the problem of serial correlation as the Durbin-Watson statistic lies in the relatively normal range i.e., within the range of 1.5 to 2.5 (Field, 2009). Further, to check the normality of the residuals, Histogram-Normality test is conducted (see Figure 6.3) where the Jarque-Bera statistic of 2.29 with a probability value of 0.318 proves the normality of the estimated model.

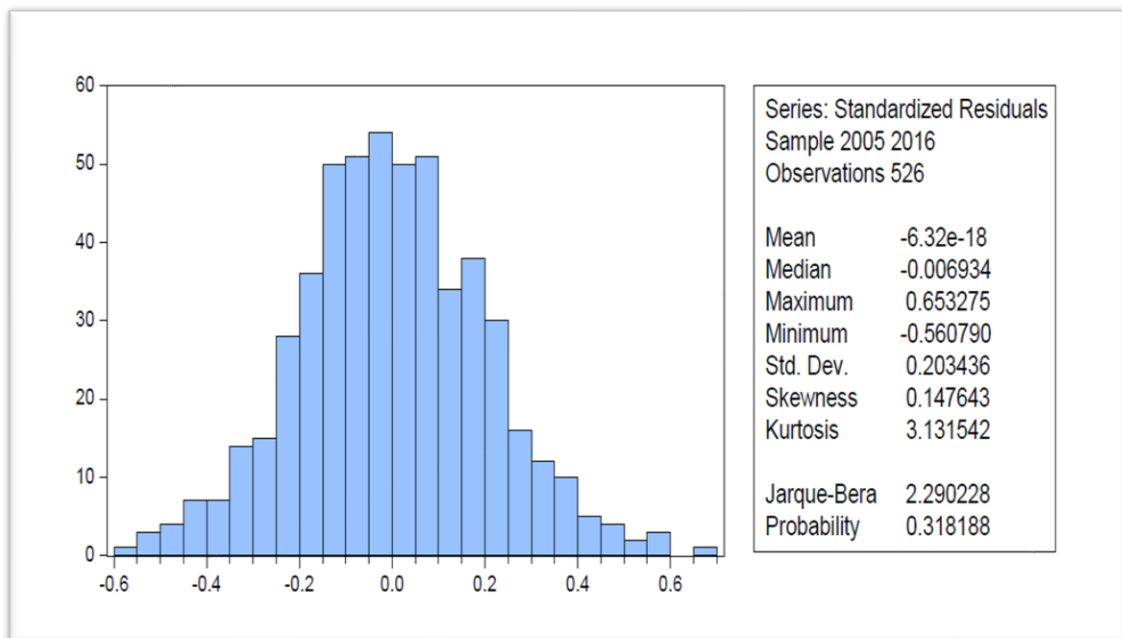
Table 6.4: Results of Panel Data Models -- LLIQTA

Variable	Fixed Effects model		Random Effects Model	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNTA	-0.25***	-11.26	-0.13***	-10.85
DTL	0.56***	3.76	0.42***	3.45
NIM	-0.26***	-4.16	-0.30***	-5.42
COF	-0.40***	-3.41	-0.96***	-11.44
NPATA	-0.03**	-2.27	-0.25*	-1.83
CAR	0.21***	3.52	0.12**	2.45
INF	0.09***	2.67	0.15***	4.49
GDP	-0.14***	-3.64	-0.18***	-4.72
C	-1.02	-1.46	-0.91	-1.51
Observations		450		450
F-Stat		14.84		46.88
Prob (F-Stat)		0.00		0.00
R ²		0.62		0.42
Durbin-Watson Stat		1.64		1.37
Hausman Test Stat		$\chi^2(8) = 75.59$ Prob > $\chi^2(0.00)$		
Chosen Model		Fixed Effects Model		

Source: Computed Results

Note: ***, ** and * indicates level of significance at 1%, 5% and 10% respectively

Figure 6.2: Residual Normality Histogram



Source: Computed Results

Having chosen the Fixed Effects Model, the study now delves into the analysis of coefficients of the regressors. It can be observed that all the regressors show a statistically significant relationship with the dependent variable LLIQTA. The variables LNTA, LDTL, LNIM, LCOF, LCAR, LINF and LGDP are statistically significant at 1 percent level while NPATA is found to be significant at 5 percent. Further, the sign coefficients associated with the regressors are all in line with the priori expectation.

The empirical findings show that 1 percent increase in deposits increases the liquidity level of banks by 0.56 percent while 1 percent increase in funding cost decreases the bank liquidity by 0.4 percent. It can be further observed that the coefficients of bank size and profitability are statistically significant with a negative sign associated with them, which implies that the size and profitability level of banks significantly reduces their liquidity holdings. Asset quality determined on the basis of non-performing loans has a significant negative relationship with bank liquidity risk but has a lower degree of impact. Similarly, the capital adequacy position of a bank is found to have a positive association but with a smaller degree of influence. Finally, the general price level (inflation rate) and economic cycles (GDP growth rate) are found to have a statistically significant effect on a bank's liquidity. The rate of inflation and the GDP growth rate have positive and negative effects respectively, but their level of impact is found to be low.

6.8. CONCLUSION

The results of the empirical analysis reveal that all the factors considered in the model equation to determine the liquidity risk of Indian banks are statistically significant and have a bearing on their level of liquidity holdings. Among the determinants, the rate of deposits and the cost of funding have the highest impact on bank liquidity. The amount

of deposits held by a bank relative to its total liabilities, reduces the liquidity risk of banks and therefore the Indian banks in periocular should focus on raising the level of deposits on their balance sheet. The funding cost is found to have a negative association with bank liquidity, resultantly increasing the liquidity risk of Indian banks. Therefore, the Indian banks should maintain a higher level of liquidity buffer when the cost of borrowing is high and when the borrowing cost goes down, they can afford to maintain a lower liquidity reserve as they can instantly borrow at a lower cost to meet any liquidity shortages.

It can be observed from the empirical results that the banks with a higher level of profitability and the ones that are relatively large in terms of total assets, tend to maintain a lower reserve of liquid assets. Hence, it can be inferred that the economies of scale of a bank influence its decision on the amount of liquidity reserve to be held. Further, the capital adequacy ratio, which is a proxy for the rate of capitalization in a bank is also found to increase the level of liquidity reserve, thus the banks should maintain a healthy capitalization rate as it helps in infusing more cash in their balance sheet. Moreover, the effect of asset quality and the macroeconomic factor are found to be significant but are expected to influence the liquidity risk of banks to a lower degree, Since the macrocosmic factors are exogenous and are beyond the banks' control, they should focus on maintaining the quality of their assets by reducing the level of impaired loans in their books.

On the basis of the empirical results, we can reject both our null hypotheses and accept the alternative hypotheses as we found significant evidence of the liquidity of Indian banks was affected by both the bank-specific and macroeconomic determinants of bank liquidity risk.

The next and the final chapter provides a summary of the previous chapters and also summarises the findings of the study. Further, it provides conclusions to be drawn and the limitations for our study on the performance and stability of commercial banks in India. Finally, it lists out suggestions and defines the scope for further research on this particular topic.

REFERENCES

- Acharya, V. V., & Kulkarni, N. (2012). What saved the Indian banking system: state ownership or state guarantees? *The World Economy*, 35(1), 19-31.
- Baltagi, B.H. (1995). *Econometric analysis of panel data*. New York: John Wiley and Sons.
- Bank for International Settlements (2008). *Principles for sound liquidity risk management and supervision*. Retrieved from <https://www.bis.org/publ/bcbs144.pdf>
- Bank for International Settlements (2009). *Enhancements to the Basel II framework*. Retrieved from <https://www.bis.org/publ/bcbs157.pdf>
- Choon, L. K., Hooi, L. Y., Murthi, L., Yi, T. S., & Shven, T. Y. (2013). *The determinants influencing liquidity of Malaysia commercial banks, and its implication for relevant bodies: evidence from 15 Malaysian commercial banks* (Honours Unpublished Thesis). Universiti Tunku Abdul Rahman, Kampar.
- Cucinelli, D. (2013). The determinants of bank liquidity risk within the context of euro area. *Interdisciplinary Journal of Research in Business*, 2(10), 51-64.
- Deléchat, C., Henao, C., Muthoora, P. and Vtyurina, S. (2014). The Determinants of Banks' Liquidity Buffers in Central America. *Monetoria, II* (1), 83-129.
- Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk? *Journal of Comparative Economics*, 37(4), 647-657.
- Field, A.P. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* (3rd edition). London: Sage.
- Moussa, M. A. B. (2015). The determinants of bank liquidity: case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1), 249-259.
- Munteanu, I. (2012). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance*, 3, 993-998.
- Parameswar, N., Murthy, S. R., & Wague, C. (2012). The determinants of bank liquidity during financial crisis: A comparative study of the GCC banking industry. *Journal of Academy of Business and Economics*, 12(3), 10-21.

- Reserve Bank of India (2012, November). Liquidity Risk Management by Banks. Retrieved from <https://rbidocs.rbi.org.in/rdocs/notification/PDFs/CLRMB07>
- Reserve Bank of India (2013, January). *Banking Stability - A Precursor to Financial Stability* (Working Paper No. 01). Mumbai: Rabi N. Mishra, S. Majumdar and Dimple Bhandia.
- 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), 40-53.
- Sudirman, I. (2015, March). *Determinants of bank liquidity in Indonesia: Dynamic panel data analysis*. 11th International Annual Symposium on Management, The Singhasari Resort, Batu, Malang, Indonesia. DOI10.2139/ssrn.2583985
- Vodova, P. (2011). Liquidity of Czech commercial banks and its determinants. *International Journal of mathematical models and methods in applied sciences*, 5(6), 1060-1067.
- Vodova, P. (2013). Determinants of commercial bank liquidity in Hungary. *e-Finanse*, 9(3), 180-188.
- Wooldridge, M. (1999). *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.

Chapter - 7

Conclusions and Recommendations

CHAPTER - 7

CONCLUSIONS AND RECOMMENDATIONS

7.1. INTRODUCTION

In this thesis, we made an attempt to examine the performance and stability parameters of the banks operating in the Indian banking Sphere. To examine the performance of Indian banks we analysed their level of profitability and also analysed the factors that played a role in determining and explaining the variability in the profitability of the Indian banks. Further, to examine the stability of Indian banks, we incorporated an analysis of the credit risk and the liquidity risk of the banks and determined the factors that have an effect on these stability parameters. Our study provides conclusive evidence to prove that the profitability of the Indian bank is a function of both the industry/market-specific and bank-specific determinants, while the credit risk and the liquidity risk are functions of bank-specific and macroeconomic determinants.

7.2. OBJECTIVES AND HYPOTHESES

We had set out the following objectives for our study:

- To analyse the determinants of profitability of Indian commercial banks
- To analyse the effect of Competition and Market Concentration on bank Profitability
- To analyse the determinants of Credit Risk in Indian commercial banks
- To analyse the impact of excess credit growth in the preceding years on asset delinquency in Indian commercial banks
- To analyse the determinants of liquidity Risk of Indian commercial banks

- To analyse the trend of liquidity holding of the Indian banking sector

The first two objectives pertain to the profitability of banks in India, and these objectives have been achieved in the fourth chapter: Determinants of Profitability. We found that the profitability level of the Indian banks is determined by both bank-specific and market-specific determinants. We also undertook a trend analysis of the market concentration and market share of Indian banks to fulfil the second objective.

The third and the fourth objectives pertain to the credit risk of banks in India, and these objectives have been achieved in the fifth chapter: Determinants of Credit Risk. We found out that the credit risk of the Indian banks is determined by both bank-specific and macroeconomic determinants. We also undertook a trend analysis of the credit growth and asset delinquency of Indian banks to fulfil the second objective and observed that the excessive credit growth in the preceding periods affects the asset delinquency of Indian banks.

The fifth and the sixth objectives pertain to the liquidity risk of banks in India, and these objectives have been achieved in the sixth chapter: Determinants of liquidity Risk. We found out that the liquidity risk of the Indian banks is determined by both bank-specific and macroeconomic determinants. We also undertook a trend analysis of the liquidity holdings of Indian banks to fulfil the sixth objective.

Further, we had set out the following null Hypotheses for our study:

(a) Profitability

H₀₁ = There is no effect of Industry-Specific Variables on bank Profitability.

H₀₂ = There is no effect of Bank-Specific Variables on bank Profitability.

(b) Credit Risk

H₀₁ = There is no effect of Bank-Specific Variables on bank Credit Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Credit Risk.

(c) Liquidity Risk

H₀₁ = There is no effect of Bank-Specific Variables on bank Liquidity Risk.

H₀₂ = There is no effect of Macroeconomic Variables on bank Liquidity Risk.

Drawing evidence from the findings from our empirical models, we can reject all the null hypotheses set out at the beginning of our study and accept the alternative hypotheses. The first two null hypotheses were rejected on the basis of the empirical results obtained in chapter four, which provides evidence to prove that the profitability of the Indian banks was affected by both the bank-specific and market/industry-specific factors. While the remaining null hypotheses were rejected on the basis of the empirical results obtained in the fifth and sixth chapter which provides evidence to prove that the credit risk and liquidity risk of Indian banks were affected by both the bank-specific and macroeconomic factors.

7.3. SUMMARY OF CHAPTERS

In this section we have presented a brief summary of the chapters, which are presented as follows:

In Chapter-1: Introduction. We provided an introduction and overview of the Indian banking sector and the various issues concerning the Indian banks. We have discussed how we came across the idea of this thesis and its importance. In the chapter, we also focused on the rationale behind the choice for our study topic and also charted out the

objectives and hypotheses of our study. We also provided a brief look at the methodology for our study.

In Chapter-2: Review of Literature. We undertook a survey of existing literature available on the Performance and Stability of the banking industry, which was divided into three parts. In the first part, we carried a survey of extant literature pertaining to the performance of banks by reviewing the studies on bank profitability. In the second and the third part, we surveyed the extant literature pertaining to the stability of banks by reviewing the studies on credit risk and liquidity risk of banks.

In Chapter-3: Research Design. We presented the research design or the research methodology of our study. We went on to framing the research design by defining the scope of the study, charting out the objectives of the study, specifying the period of the study, and then move forward with the selection of the data structure, sample size, and the sources of data. We also formulated the hypotheses of our study and the empirical models to be used to test these hypotheses.

In Chapter-4: Determinants of Profitability. We started with our analysis of the empirical models. We first delved into the analysis of banking performance by examining the banking performance parameter of profitability. Through this chapter, we tried to present an overview of the status of profitability situation of the Indian banking sector and also conducted an analysis of the market structure of the Indian banking sector by examining the trends of the market concentration level and market share of the various bank groups. Thereon we went further to examine the factors that affect the level of profitability in Indian banks by analysing the bank-specific and market/industry determinants that influence a bank's profit-earning capacity. Upon

obtaining the results from our empirical model, we presented a thorough analysis and discussion of the empirical findings and highlighted the major issues concerning the profitability of the Indian banks

In Chapter-5: Determinants of Credit Risk. We delved into the analysis of banking stability by examining the banking stability parameter of credit risk. Through this chapter, we tried to present an overview of the status of the credit risk situation of the Indian banking sector and also conducted an analysis of the credit growth and the asset delinquency rate trend of the various bank groups. Thereon we went further to examine the factors that affect the credit risk in Indian banks by analysing the bank-specific and macroeconomic determinants that influence a bank's asset delinquency rate. Upon obtaining the results from our empirical model, we presented a thorough analysis and discussion of the empirical findings and highlighted the major issues concerning the credit risk of the Indian banks.

In Chapter-6: Determinants of Liquidity Risk. We continued our analysis of banking stability from the previous chapter and proceeded further to examine the banking stability parameter of liquidity risk. Through this chapter, we tried to present an overview of the liquidity holdings of the Indian banking sector and also conducted an analysis of the liquidity trends of the various bank groups. Thereon we went further to examine the factors that affect the liquidity risk in Indian banks by analysing the bank-specific and macroeconomic determinants that influence a bank's holding of liquid assets. Upon obtaining the results from our empirical model, we presented a thorough analysis and discussion of the empirical findings and highlighted the major issues concerning the liquidity risk of the Indian banks.

7.4. SUMMARY OF FINDINGS

The major findings derived from the results of our empirical models are presented in the three subsections; determinants of profitability, determinants of credit risk, and determinants of liquidity risk. They are presented as follows:

7.4.1. Determinants of Profitability

From the analysis of the empirical results, it can be concluded that the profitability of Indian banks was significantly affected by both the bank-specific and the market-specific factors. The results of the empirical analysis reveal that all the factors, except for the market share of banks, considered in the model equation to determine the profitability of Indian banks are statistically significant and have a bearing on their ability to earn profits. Among the determinants, the effect of operating expenditure incurred by the banks and the concentration in the market had the highest impact on bank profitability.

The market concentration in the Indian banking industry remained fairly competitive as the HHI scores persisted below the 1500 mark and were also found to have a positive association with bank profitability which is in line with the priori expectation and provides evidence of improved profitability of banks if the industry consolidates into a fewer number of banks.

Market share of the banks classified by ownership pattern remained fairly consistent during the study period. The empirical results indicate a negative but statistically insignificant association of market share with bank profitability. This is contrary to our priori expectation and may be attributed to the fact that the majority of market share in the Indian banking sector is held by the public sector banks which are

plagued with the issue of lower profitability, thereby negating the impact of a higher market share held by them on their capacity to earn profits.

Further, among the bank-specific regressors, the level of operating expenses expended by the banks had the highest effect on its profitability level. A 1 percent increase in such expenses reduces profitability by more than 5 percent. Therefore, it becomes imperative for the banks to cut down on their level of operating cost in order to achieve higher levels of profitability.

Moreover, the quality of assets held by a bank measured by the proportion of impaired loans to the total advances was found to have a negative impact on its profitability. As the level of asset delinquency surges, it affects a bank's profitability in three ways, firstly it curtails the income received by the banks from its Interest-Based Sources. Secondly, the incremental rise in NPA levels requires the banks to make adjustments for necessary provisioning, which is a charge against its profits. Thirdly, due to statutory requirements, the banks have to maintain a higher capital adequacy level without which they are restricted from floating additional credit.

Lastly, the size of the bank and the spread of the net interest margin earned by a bank was found to have a positive effect on its profit earning capability. The effect of banks size on its profitability was found to be very low, while the impact of net interest margin was found to be at a moderate level. Thus, the banks should focus on improving their level of efficiency with respect to the size of their banking operations.

7.4.2. Determinants of Credit Risk

From the analysis of the empirical results, it can be concluded that the asset quality of Indian banks was largely affected by their credit policy. The results of the empirical analysis reveal that all the factors considered in the model equation to determine the

credit risk of Indian banks are statistically significant and have a bearing on their level of asset delinquency. Among the determinants, the effect of excessive credit growth had the highest impact on bank credit risk. As it is evident from the findings that expansionary lending practices during the periods of economic boom led to excessive credit growth among the banks which in the later periods resulted in higher incidences of asset delinquency.

From the results, we observed that the variable asset restructuring had a negative and statistically significant association with the level of delinquent assets held by a bank. This can be attributed to the unsound practice of asset restructuring and evergreening of loans followed by the Indian banks in order to escape from the brunt of additional provisioning. This led to stockpiling of substandard and loss assets over a period of time, which is, in fact, a matter of concern as these substandard loans are kept on being restructured into standard assets, it will be catastrophic for the banks if these assets are not written off in time.

Further, the priority sector lending had a significant negative effect on the credit risk of the Indian banks. Contrary to the general belief, these loans do not contribute much to the asset delinquency or the level of NPAs of Indian banks, rather it has a negative association primarily because most of these advances are retail loans or farm loans which are in receipt of government waivers. The profitability and the size of the banks had a very low impact on the asset quality of Indian banks; thus, the credit policy of the banks should be framed independently from the influence of its profit earning capability or the size of the bank's total assets.

Moreover, the effect of accumulated bad loans and the macroeconomic factor are found to be positively associated with the credit risk of banks. The lagged NPAs or

the accumulated bad loans impaired the credit lending ability of Indian banks from issuing fresh loans and in turn led to higher incidences of delinquent assets to accumulate over time. Lastly, the growth rate of GDP representing the effect of economic cycles did not have any impact on the credit lending policy of banks in India.

7.4.3. Determinants of Liquidity Risk

The results of the empirical analysis revealed that all the factors considered in the model equation to determine the liquidity risk of Indian banks are statistically significant and have a bearing on their level of liquidity holdings. Among the determinants, the rate of deposits and the cost of funding have the highest impact on bank liquidity.

The proportion of deposits held by a bank relative to its total liabilities reduces the liquidity risk of banks and therefore the Indian banks in periocular should focus on raising the level of deposits on their balance sheet.

The funding cost is found to have a negative association with bank liquidity, resultantly increasing the liquidity risk of Indian banks. Therefore, the Indian banks should maintain a higher level of liquidity buffer when the cost of borrowing is high and when the borrowing cost goes down, they can afford to maintain a lower liquidity reserve as they can instantly borrow at a lower cost to meet any liquidity shortages.

It can be observed from the empirical results that the banks with a higher level of profitability and the ones that are relatively large in terms of total assets, tend to maintain a lower reserve of liquid assets. Hence, it can be inferred that the economies of scale of a bank influence its decision on the amount of liquidity reserve to be held.

Further, the capital adequacy ratio, which is a proxy for the rate of capitalization in a bank is also found to increase the level of liquidity reserve, thus the banks should

maintain a healthy capitalization rate as it helps in infusing more cash in their balance sheet.

Moreover, the effect of asset quality and the macroeconomic factor is found to be significant but are expected to influence the liquidity risk of banks to a lower degree, Since the macrocosmic factors are exogenous and are beyond the banks' control, they should focus on maintaining the quality of their assets by reducing the level of impaired loans in their books.

7.5. SUGGESTIONS AND POLICY RECOMMENDATIONS

Based upon the findings and analysis of the result obtained from our empirical models pertaining to profitability, credit risk, and liquidity risk, we provide the following suggestions which would help in improving the performance and stability of the banks operating in India:

- The operating expenses of the Indian banks determined with respect to their total assets were found to be a major factor that brought down their level of profitability. Therefore, it is imperative for the banks to cut down on their level of operating cost in order to achieve higher profitability.
- The quality of assets is found to have a negative impact on profitability as the level of asset delinquency surges it affects a bank's profitability in three ways, firstly, it curtails the income received by the banks from its Interest-Based Sources. Secondly, higher NPAs require the banks to make adjustments for necessary provisioning, which is a charge against profits. Thirdly, due to statutory requirements, the banks have to maintain a higher capital adequacy level without which they are restricted from floating additional credit. Thus, the

Indian banks should frame proper credit policies to bring down their level of bad loans and resultantly improve their profitability.

- The Market concentration in the Indian banking industry remains fairly competitive during the period of the study and is also found to have a positive association with bank profitability which is in line with the priori expectation and provides evidence of improved profitability of banks if the industry consolidates into a fewer number of banks. Thus, the government should take a cue from this and initiate the process of consolidation of the public sector banks, which would help in improving their levels of profitability.
- The findings from the analysis of our empirical model revealed that the asset quality of Indian banks is largely affected by their credit policy. As it is evident from the findings that expansionary lending practices adopted by the public sector banks on the direction of the government to fund public infrastructure projects during the period of economic boom led to excessive credit growth among the banks which resulted in higher incidences of asset delinquency in the later years. Therefore, we recommend the government to keep a arm's length distance from the public sector bank's credit policy decisions and promote autonomy in their management. We also recommend that the banks should refrain from the practice of excessive credit growth during periods of economic boom.
- Further, from our analysis of the credit risk of Indian banks, we observed that the Indian banks especially the public sector banks indulged in the unsound

practice of asset restructuring and evergreening of loans and not classifying them according to the RBI's guidelines on asset classification, in order to escape from the brunt of additional provisioning. This has led to the stockpiling of substandard and doubtful assets over a period of time. Thus, the regulator i.e., the RBI should at regular intervals undertake AQR to thoroughly inspect the books of the Indian banks and impose a heavy penalty on these banks if caught practicing asset restructuring.

- The amount of deposits held by a bank relative to its total liabilities reduces the liquidity risk of banks and therefore the Indian banks in periphery should focus on raising the level of deposits on their balance sheet.
- The cost of funding is found to have a negative association with bank liquidity, resultantly increasing the liquidity risk of Indian banks. Therefore, the Indian banks should maintain a higher level of liquidity buffer when the cost of borrowing is high and when the borrowing cost goes down, they can afford to maintain a lower liquidity reserve as they can instantly borrow at a lower cost to meet any liquidity shortages.
- From the results of our empirical models, we found that the rate of capitalization in a bank is also found to increase the level of liquidity reserve, thus the banks should maintain a healthy capitalization rate as it helps in infusing more cash in their balance sheet.

7.6. LIMITATIONS OF THE STUDY AND SCOPE FOR FUTURE RESEARCH

In our attempt to analyse the performance and stability of banks in India, our study has been bound by the following limitations:

- Our analysis of the performance and stability parameters of the banks operating in India could not incorporate the foreign banks in our sample and was confined to only the Indian public and private sector banks. The foreign banks could not be analysed because our empirical models consisted of regressors that primarily impacted the Indian banks and analysing the foreign banks with the help of such models would yield erroneous results. Thus, a standalone analysis of the foreign banks can be undertaken by incorporating an empirical model that includes regressors that are relevant and specific to these banks in future studies.
- Our study was carried out for a period of 10 years commencing from the FY 2005-06 and till FY 2014-15. The choice of the above period was based on the fact that the data pertaining to the various health parameters of the banks in India was made publicly available in a consolidated form, from the FY 2005-06 onwards. Further, the process of AQR undertaken by the RBI in the FY 2015-16 unearthed the issues of non-disclosure and wrongful classification of doubtful and substandard loans being practiced by the banks. The AQR in turn, impacted all the performance and stability parameters of the banks as reported from FY 2015-16 onwards till FY 2017-18, as the banks had to set aside funds for statutory provisioning and writing off the delinquent assets. Thus, it leaves scope for future studies to analyse the performance and stability parameters of

the banks operating in India for a period commencing from FY 2018-19 onwards.

- As our study was undertaken at an individual level and without any institutional assistance in the form of research resources and manpower, we incorporated a panel data regression framework, and our empirical models utilized two-period lagged annual data pertaining to the performance and stability parameters of the Indian banks as the RBI releases these data in the public domain with a lag of 2 years. Thus, an institutional level study can be undertaken in the future, incorporating high-frequency quarterly data pertaining to the performance and stability parameters and estimating them under a VAR framework, which would yield better results.

BIBLIOGRAPHY

- Abid, L., Ouertani, M. N., & Zouari-Ghorbel, S. (2014). Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*, 13, 58-68.
- Acharya, V. V., & Kulkarni, N. (2012). What saved the Indian banking system: state ownership or state guarantees? *The World Economy*, 35(1), 19-31.
- Ahmad, N. H., & Ariff, M. (2008). Multi-country study of bank credit risk determinants. *International Journal of banking and Finance*, 5(1), 135-152.
- Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2019). The determinants of liquidity of Indian listed commercial banks: A panel data approach. *Cogent Economics & Finance*, 7(1), 1616521.
- Allen, F., & Gale, D. (2004). Financial fragility, liquidity, and asset prices. *Journal of the European Economic Association*, 2(6), 1015-1048
- Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2019). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics*, 24(1), 168-185.
- Alshatti, A. S. (2016). Determinants of banks' profitability—the case of Jordan. *Investment Management & Financial Innovations*, 13(1), 84.
- Arif, A., & Nauman Anees, A. (2012). Liquidity risk and performance of banking system. *Journal of Financial Regulation and Compliance*, 20(2), 182-195.
- Arora, P. (2014). Reforms, ownership and determinants of efficiency: An empirical study of commercial banks in India. *Journal of Emerging Market Finance*, 13(1), 103-138.

- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, 18(2), 121-136.
- Atikogullari, M. (2009). An analysis of the Northern Cyprus banking sector in the post-2001 period through the CAMELS approach. *International Research Journal of Finance and Economics*, 32(10), 212-229.
- Baltagi, B.H. (1995). *Econometric analysis of panel data*. New York: John Wiley and Sons.
- Bank for International Settlements (2005). Sound Credit Risk Assessment and Valuation for Loans. Retrieved from <https://www.bis.org/publ/bcbs126.pdf>
- Bank for International Settlements (2008). *Principles for sound liquidity risk management and supervision*.
- Bank for International Settlements (2009). *Enhancements to the Basel II framework*. Retrieved from <https://www.bis.org/publ/bcbs157.pdf>
- Bardhan, S., & Mukherjee, V. (2016). Bank-specific determinants of nonperforming assets of Indian banks. *International Economics and Economic Policy*, 13(3), 483-498.
- Barua, R., Roy, M., & Raychaudhuri, A. (2016). Structure, conduct and performance analysis of Indian Commercial Banks. *South Asian Journal of Macroeconomics and Public Finance*, 5(2), 157-185.
- Basel Committee on Banking Supervision. (2010). *Basel III: International framework for liquidity risk measurement, standards and monitoring*. Bank for International Settlements.
- Bhati, S., De Zoysa, A., & Jitree, W. (2019). Factors affecting the liquidity of commercial banks in India: a longitudinal analysis. *Banks and Bank Systems*, 14(4), 78.

- Bhattacharyya, A., Lovell, C. K., & Sahay, P. (1997). The impact of liberalization on the productive efficiency of Indian commercial banks. *European Journal of operational research*, 98(2), 332-345.
- Căpraru, B., & Ihnatov, I. (2015). Determinants of bank's profitability in EU15. *Annals of the Alexandru Ioan Cuza University-Economics*, 62(1), 93-101.
- Choon, L. K., Hooi, L. Y., Murthi, L., Yi, T. S., & Shven, T. Y. (2013). *The determinants influencing liquidity of Malaysia commercial banks, and its implication for relevant bodies: evidence from 15 malaysian commercial banks* (Honours Unpublished Thesis). Universiti Tunku Abdul Rahman, Kampar.
- Cucinelli, D. (2013). The determinants of bank liquidity risk within the context of euro area. *Interdisciplinary Journal of Research in Business*, 2(10), 51-64.
- Deléchat, C., Henao, C., Muthoora, P. and Vtyurina, S. (2014). The Determinants of Banks' Liquidity Buffers in Central America. *Monetoria, II* (1), 83-129.
- Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy*, 91(3), 401-419.
- Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk? *Journal of Comparative Economics*, 37(4), 647-657.
- Field, A.P. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* 3rd edition). London: Sage.
- Garcia, M. T. M., & Trindade, M. J. (2019). Determinants of banks' profitability in Angola. *African Journal of Economic and Management Studies*.
- Horváth, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research*, 45(3), 341-361. *International Journal of Central Banking* 2(2): 65-98.

- Jiminez.G. and J., Saurina, 2006. Credit cycles, credit risk and prudential regulation. *International Journal of Central Banking* 2(2): 65-98.
- Kaur, H. V. (2010). Analysis of banks in India—A CAMEL approach. *Global Business Review*, 11(2), 257-280.
- Kawshala, H., & Panditharathna. K. (2017). The Factors Effecting on Bank Profitability. *International Journal of Scientific and Research Publications*, 7(2), 212-216.
- Kumar, S. (2008). An analysis of efficiency–profitability relationship in Indian public sector banks. *Global Business Review*, 9(1), 115-129.
- Kundid, A., Škrabić, B., & Ercegovac, R. (2011). Determinants of bank profitability in Croatia. *Croatian Operational Research Review*, 2(1), 168-182.
- Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of monetary Economics*, 46(1), 31-77.
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, 36(4), 1012- 1027.
- Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, 61(2), 193-206.
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International journal of economics and financial issues*, 3(4), 852-860.
- Misra, B. M., & Dhal, S. (2010). Pro-cyclical management of banks' non-performing loans by the Indian public sector banks. *BIS Asian Research Papers*, 16, 1-23.
- Morina, D. (2020). Determinants of Credit Risk in Commercial Banks of Kosovo. *International Journal of Economics & Business Administration (IJEBA)*, 8(2), 179-190.

- Moussa, M. A. B. (2015). The determinants of bank liquidity: case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1), 249-259.
- Muchtar, S., & Rustimulya, G. S. (2019). Determinants of Liquidity Risk In Banking Sector On The Indonesia Stock Exchange. *Jurnal Manajemen*, 23(3), 461-480.
- Munteanu, I. (2012). Bank liquidity and its determinants in Romania. *Procedia Economics and Finance*, 3, 993-998.
- Nikolaidou, E., & Vogiazas, S. D. (2014). Credit risk determinants for the Bulgarian banking system. *International Advances in Economic Research*, 20(1), 87-102.
- Osuagwu, E. (2014). Determinants of bank profitability in Nigeria. *International Journal of Economics and Finance*, 6(12), 46-63.
- Parameswar, N., Murthy, S. R., & Wague, C. (2012). The determinants of bank liquidity during financial crisis: A comparative study of the GCC banking industry. *Journal of Academy of Business and Economics*, 12(3), 10-21.
- Rath, B. N., & Samantaraya, A. (2015). Determinants of Bank Profitability in the Post-reform Period: Evidence from India. *Global Business Review*, 16(5), 82S-92S.
- Ratnovski, L. (2013). Liquidity and transparency in bank risk management. *Journal of Financial Intermediation*, 22(3), 422-439.
- RBI (2012). Liquidity Risk Management by Banks. *Monetary Policy Statement 2012-13 announced on April 17, 2012.*, Retrieved from <https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=7680>
- RBI (2013). *Banking Stability - A Precursor to Financial Stability* (Working Paper No. 01). Mumbai: Rabi N. Mishra, S. Majumdar and Dimple Bhandia.

- Rudhani, L. H., Ahmeti, S., & Rudhani, T. (2016). The Impact of Internal Factors on Bank Profitability in Kosovo. *Acta Universitatis Danubius. OEconomica*, (12 (1)), 95-107.
- Samantaraya, A. (2016). Procyclical credit growth and bank NPAs. *Economic and Political Weekly*, 51(12), 112-119.
- Sanyal, P., & Shankar, R. (2011). Ownership, competition, and bank productivity: An analysis of Indian banking in the post-reform period. *International Review of Economics & Finance*, 20(2), 225-247.
- Seenaiyah, K., Rath, B. N., & Samantaraya, A. (2015). Determinants of bank profitability in the post-reform period: Evidence from India. *Global Business Review*, 16(5_suppl), 82S-92S.
- 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), 40-53.
- Singh, D. D. (2010). Bank specific and macroeconomic determinants of bank profitability: the Indian evidence. *Paradigm*, 14(1), 53-64.
- Sopan, J., & Dutta, A. (2018). Determinants of liquidity risk in Indian banks: A panel data analysis. *Asian Journal of Research in Banking and Finance*, 8(6), 47-59.
- Sudirman, I. (2015). *Determinants of bank liquidity in Indonesia: Dynamic panel data analysis*. 11th International Annual Symposium on Management, The Singhasari Resort, Batu, Malang, Indonesia. DOI10.2139/ssrn.2583985
- Thiagarajan, S., Ayyappan, S., & Ramachandran, A. (2011). Credit risk determinants of public and private sector banks in India. *European Journal of Economics, Finance and Administrative Sciences*, 34(34), 147-153.
- Vodova, P. (2011). Liquidity of Czech commercial banks and its determinants. *International Journal of mathematical models and methods in applied sciences*, 5(6), 1060-1067.

- Vodova, P. (2013). Determinants of commercial bank liquidity in Hungary. *e-Finanse*, 9(3), 180-188.
- Wanamali, H. A. (2020). *An Evaluation of the Determinants of Bank Liquidity: A Case Study of Commercial Banks in Sri Lanka*. 9th International Conference on Management and Economics.
- Wooldridge, M. (1999). *Econometric analysis of cross section and panel data*. Cambridge: MIT Press.