UNIVERSITY of RWANDA

COLLEGE OF BUSINESS AND ECONOMICS

FINANCIAL RISKS MANAGEMENT ON PROFITABILITY OF COMMERCIAL BANKS IN RWANDA

Thesis submitted to the University of Rwanda, College of Business and Economics in Partial Fulfillment of Requirements for the Award of the Degree of Master of Business Administration in Finance option

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August , 2022

DECLARATION

This thesis is my original work and has not yet been published by any other person in any other university or higher learning institution. No part of this research should be reproduced without the author's consent or that of University of Rwanda.

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This thesis has been submitted by our approval as University of Rwanda Supervisor.

Dr. Samuel MUTARINDWA

Sign: ……... Date: 27/09/2022

DEDICATION

To

My parents,

My brothers and sisters,

The whole family.

ACKNOWLEDGEMENT

There are several people without whom this research could not have been a success and to whom I am greatly indebted.

Above all, my heart is very grateful to the Almighty God for his endless grace, blessings and strength that enable me to accomplish this work.

My deepest affection and gratitude go to my parents, siblings for their substantial support involved in accomplishing this project with a full-time demanding job. Their dedication and counsel made it literally possible for me to concentrate and meet deadlines in completing the work. I appreciate my classmates for believing in me and supporting me from the start to the end of this research.

A great appreciation is addressed to the supervisor, Dr. Samuel MUTARINDWA for his guidance and constructive suggestions during the planning and development of this research proposal and dedication to the successful completion of this research proposal. His willingness to give his time so generously is very much appreciated. This research work could not have been completed on time without his help and support. He was always there even when the end seemed so far. He ensured a well done research proposal was finalized.

I recognize the lecturers of school of business and economics of University of Rwanda for sharing their knowledge on various issues during the course of this study.

Finally, I wish to extend my appreciations to all my family members and every person who cooperated and assisted me in this study. Special thanks go to all my friends including colleagues from UR who supported me and incented me to strive towards my goal.

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LIST OF ABBREVIATIONS AND ACCRONYMS

ACCA : Association of Chartered Certified Accountants

ACGN : Africa Corporate Governance Network

ASE : Amman Stock Exchange

BK : Bank of Kigali

BNR : National Bank of Rwanda

CAR : Capital Adequacy ratio

IMF : International Monetary Fund

KCB : Kenya Commercial Bank

MFIs : Microfinance Institutions

NPL : Non Performance Loans

NPLR : Non Performance Loans Ratio

NPM : Net Profit Margin

ROA : Return on Assets

ROE : Return on Equity

RSE : Rwanda Stock Exchange

SACCOs : Savings and credit Cooperatives

SPSS : Statistical Package for Social Sciences

WB : World Bank

KEY WORDS

Financial risk management: Financial Risk Management is the process of identifying risks, analysing them and making investment decisions based on either accepting, or mitigating them. In banking for instance, the Basel Accords are a set of regulations adopted by international banks that help to track, report and expose credit, liquidity , marketing and operational risks.

Liquidity risks management: Management of liquidity risk is the capability of financial institutions to enhance a balance between avoiding the problem of retaining excess liquid assets and at the same time ensuring that the bank does not run out of liquid assets to honor its financial commitments as they fall due

Credit risk management: Credit management is a set of policies and procedures implemented by banking institutions with the purpose of identifying, measuring and monitoring the movement of interest rate to restrain and avoid the unfavorable risk's impacts and may be making use of fluctuation of yield curve to obtain new opportunities

Operating risk management: Operational risk management is defined as a continual recurring process that includes risk assessment, risk decision making, and the implementation of risk controls, resulting in the acceptance, mitigation, or avoidance of risk

Profitability: Profitability is the ability to make profit from all the business activities of an organization, company, firm, or an enterprise. In this study, the profitability was measured by using return on assets (ROA), return on equity (ROE) and net profit margin (NPM)

Return on assets (ROA): Return on Assets (ROA) is an indicator of how well a company utilizes its assets, by determining how profitable a company is relative to its total assets. Return on equity (ROE): Return on Equity is the total income owned and controlled by a Bank divided by total Equity

Net Profit Margin (NPM): Net profit margin is equal to how much net income or profit is generated as a percentage of revenue. a measure of profitability.

Commercial Bank: Commercial Bank is a financial institution which provides services, like accepting deposits, giving business loans and auto loans, mortgage lending, and basic investment products like savings accounts and certificates of deposit

ABSTRACT

This work titled “Financial risks management on profitability of commercial banks in Rwanda)” was guided by the following specific objectives: to assess the effect of liquidity risks management on profitability of selected banks in RSE; to examine the effect of credit risk management on profitability of selected banks in RSE; to find out the effect of operating risk management on profitability of selected banks in RSE and to determine the effect of bank size on profitability of selected banks in RSE. Since the aim of this study is to investigate the effect of financial risks management on profitability of commercial banks in Rwanda with reference of selected banks in Rwanda stock exchange, the researcher adopted quantitative research design. Four commercial banks that are listed on the Rwanda Stock Exchange (RSE) were sampled and their financial statements analyzed for the period of 2015 up to 2020. The study used descriptive statistics, correlation analysis and multiple regression analysis as method of data analysis. The findings revealed that credit and operational risks adversely affect the financial performance of commercial banks (ROA, ROE, and NPM) whereas liquidity risks modestly affect banks’ financial performance. More also, firm size (proxied by total assets) also significantly increased banks’ ROA and net profit margins. The results revealed that the value of coefficient of determination (Adjusted R Square) was 0.31564 (31.56%), an indication that there was variation of 31.56% in profitability items of ROE of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. The study recommended that selected commercial banks in RSE should mold a permanent and improve its risk mitigation techniques and is also indispensable to make all staff aware of risk issues they are exposed to Selected commercial banks in Rwanda’s internal audit group is mandated to conduct consistent reviews of the operational risk management involvement of the board of management and senior portfolio managers of selected commercial banks in Rwanda are expected to participate in risk management.

Key words: Financial risk management; profitability and commercial banks

CHAPTER ONE

GENERAL INTRODUCTION

The chapter explores the background of the study, problem statement, objectives of the study, research questions as well as research hypothesis. The chapter also states the significance of this study, scope of the study, conceptual framework, and operational definition of key terms.

1.1. Background of the study

The past decade has seen the world witnessing one of the most shocking financial meltdowns. The effects of the crisis were pervasive and hit almost every sector of global businesses; the most affected sector was the financial services industry, specially the banking sector. The banking sector did not only witness the dramatic disappearance of the most renowned institutions it also became a regular target for tougher regulations, public anger and academic criticism. There are numerous explanations on the causes of the current financial crisis. One factor that has received significant attention during this crisis is risk management discourse. It seems that risk management has become an important tool, from which banks try to achieve legitimacy in the eyes of the public and regulators (Anas & Fauziah, 2014).

Over the last decades, risk analysis and corporate risk management activities have become very important elements for both financial as well as non-financial corporations. Risks are uncertainties that are always evident in all business establishments that are in place with the sole aim of making profits. Financial institutions in their part are exposed to various kinds of risks among them credit risk, interest rate risk, liquidity risk, market risk, foreign exchange risk, currency risk, commodity risk and operational risk which are the most applicable risk to the banks (Alexandre, 2011).

Credit risk, also called default risk, is the risk associated with a borrower going into default that is not making payments as promised. There is always the possibility for the borrower to default from his or her commitments for one or the other reason resulting in crystallization of credit risk to the bank. These losses could take the form of outright default or alternatively, losses from changes in portfolio value arising from actual or perceived deterioration in credit quality that is short of default (Ahmed *et al*., 2011).

In the 1980's and early 1990's, several countries in developed, developing and transition economies experienced several banking crises requiring a major overhaul of their banking systems (Basel Committee on Banking Supervision, 2015). As the banking sector continues to embrace innovations, the intensity and variety of risks that the players are exposed also continue to increase in tandem. To ensure that the growth in the banking sector does not jeopardize its stability, risk management is crucial (Umut *et al*., 2016).

A 1995 survey of major financial firms in Unites States of America (USA) revealed that at least 90% are using some form of financial engineering to manage market risks which are interest rates, foreign exchange, or commodity price risks (Bodnar & Marston, 2017). Although the types of risks confronting managers vary across industries, there is substantial commonality in the underlying rationale for the use of derivatives and the financial engineering techniques that are employed. Global concerns about financial risk have been increasing. In this climate, firms of all kinds and sizes are looking to develop robust financial risk management frameworks that satisfy compliance demands, contribute to better decision making, and enhance performance. According to Olusanmi *et al*., (2015), a consistent framework for evaluating firm wide risk and return across diverse financial activities is a key to evaluating the benefits of potential mergers among banking

firms. Banks and other intermediaries can transfer the payment delays and the credit risk among producers, or between producers and outside investors (Umar *et al*., 2015).

In financial crisis of 2007 to 2009 bank regulators crafted Basel III Capital requirements aimed at providing banks with sufficient reserves to enable withstand any crisis in future which focused on credit risk, liquidity risk, and market risk (Simone, 2011). Bank systems face excessive risks though as per Markowitz portfolio theory which assumes that a risky investment earns more profits. Regulatory agencies aim at reducing happening of crises, but banks desire high profits so that they can pay their clients for the funds advanced. These procedures are linked to high risks when providing financial services they assume different financial risk (Helder, Délio & Renato, 2011).

In the banking sector worldwide, the Basel Accords are generally adopted by internationally active banks for tracking, reporting and exposing operational, credit and market risks. As a way of evaluating and managing current and possible financial risk at a firm financial, risk managers must identify the risk, evaluate all possible remedies, and then implement the steps necessary to alleviate the risk. These risks are typically remedied by using certain financial instruments as a method of counteracting possible ramifications. Financial risk management cannot prevent a firm from all possible risks because some are unexpected and cannot be addressed quickly enough (Siba, 2012).

In 2003 Euro bank collapsed with billions of shillings of Parastatals which caused crippling liquidity against regulatory central bank of Kenya, this forced the government to pass the money laundering bill and Credit Reference Bureaus in 2009 (Sundararajan & Balino, 2011). Liquidity risk arises due to a bank inability to meet its obligation without incurring losses, thus it's a risk of being unable to liquidate a position at reasonable price and timely (Arif & Anees, 2012).

Commercial bank activities include provision of services, engaging in financial intermediation, products loans to customers, and overall management of risk. This calls for financial systems to be analysed from a functional perspective other than institutional perspective as the functions are more stable for a long period of time than the institution (Santomero, 2017). Financial risk management enables financial institution to put in place safeguards to reduce the potential losses that emanate from uncertainties in the financial markets (Aleksandra, Dalia & Julija, 2014).

There are arises extreme changes in value of a currency against other world currencies for most African countries this is be due to difference in accounting, markets, taxation auditing standards; economic, diplomatic or political conflict leading to exposure to foreign exchange risk. Some securities or asset which banking sector deal in at times may not be traded quickly without incurring losses, this leads to liquidity risk in banking sector or may arise when liabilities of a bank cannot be met when due leading to extra charges on the banking sector. A change in market risk factors may also affect the value of investment or trading portfolio to decrease, among other factors include foreign exchange rates, stock prices, commodity prices and interest rates (Cicea & Hincu, 2009).

In the Brong Ahafo Region of Ghana, credit risk has an impact on the profitability of rural and community banks (Afriyie & Akotey, 2012). Credit risk management efficiency in Nigerian commercial banking sector from 2004 through 2009 provides some further insight into credit risk as profit enhancing mechanism (Onaolapo, 2012). According to Obamuyi (2013) performance of banks in Nigeria over the last decade remained unimpressive. The profit before tax between 2002 and 2005 fluctuated and declined opportunities for banks. This could have been caused by the global economic crises and the fact that some of the criteria employed to measure the performance of the banks have been compromised.

In eastern African countries like Kenya, banking sector in Kenya is exposed to various risks which originate from both the internal and external environment. Financial risk threaten their financial viability and long-term sustainability. Mwangi (2014) studied the effect of credit risk management on commercial bank performance. He measured performance with return on equity (ROE) and performance was assessed using non-performing loan ratio (NPLR) and capital adequacy ratio (CAR). It was found out that both NPLR and CAR had a negative and relatively significant effect on ROE. According to Aduda and Gitonga (2011) the most common risks in banking includes; credit, liquidity, market operational, strategic and compliance risks though the strategic and compliance risks may be as result of operational activities and therefore can be include in operational risks

In Rwanda, the topic of financial risk management has drawn much attention among various authors and scholars. In view of this, the Central bank of Rwanda carried out a risk management survey on the Rwandan banking sector in September 2017. The survey's objective was to determine the needs of the local banking sector with regard to risk management. Their finding was that generally the institutions revealed that the Risk Management Guidelines issued in 2005 had, for the majority of them; enhanced risk-awareness and risk management at the institutions, increased the efficiency and effectiveness of risk management, helped reduce financial losses, led to the establishment of effective and better-resourced risk management functions, and enhanced the overall decision-making processes in their institutions (BNR, 2018).

BNR annual report (2018) showed that the banking sector registered enhanced performance during the period ended December 2018. The sector recorded a 16.6 %growth in pre-tax profits during the year. Total net assets and total deposits recorded growth rates of 16.0 % and 13.3 % respectively. Despite the growth in the Rwandan banking sector, the sector still faces many

challenges including stiff competition from MFIS, mortgage firms and SACCOs and competition over the last few years resulting from increased innovations in the market, specifically from the emergence of M-Payments and E-Payments coupled with adherence to the BNR stringent regulations.

Empirical studies on financial risk and performance of banks include, Afriyie & Akotey (2012), , Onaolapo (2012), Maina (2016); Shetty& Yadav (2018). However, some of these studies were centered on other countries other than Rwanda. In addition, some of the studies centered on Rwanda like Harelimana (2017) and Mbyayingabo (2018) used questionnaire as tool of data collection on the effect of financial risk analysis and profitability of banks which is only give the views of employees on the variables of interest, and concentrate only on a single variable of financial risk analysis and also have some mixed results.

1.2 Problem statement

The primary objective of managing banks is to improve bank performance so as to maximize shareholders returns and acquire substantial profit either for expansion or to undertake new product development. This objective is meet at the expense of increased risk which is not always accompanied with the high returns and hence may sometime lead to underperformance (Olusanmi *et al*., 2015). Risk management is considered by researchers as a yard stick for determining failure or success of a financial institution. Across the banking industry in Rwanda, the most prominent area that erodes the mass of their profit is risk management.

Despite central bank of Rwanda providing prudential guidelines to guide commercial banks manage and improve their return on assets but some commercial banks have experienced liquidity risks making them unable to raise sufficient funds to fulfill their obligations resulting to

statutory receivership (BNR, 2019). BNR supervision annual report (2019) indicated that the ratio of non-performing loans to gross loans increased from 6.2% in December 2015 to 8.1 % in December 2017. Banks are faced with a challenge of short-term funds where Rwandan banks rely on deposits at a tune of 77.1 % of their total liabilities. As at end June 2019, the total outstanding loans of banks (FRW 2,008 billion) went to 378,809 beneficiaries accounts for 5.2 % of total adult population and also banking sector in Rwanda are exposing on high share of mortgage loans to total loans of banks increased from 29.4 % in 2014 to 34.9 %in 2019 (NBR, 2019).

The increase of a number of financial risk in banking sector in Rwanda has contributed decline in profitability of some commercial banks listed in Rwanda stock exchange for instance Bank of Kigali (BK) and KCB Bank Rwanda Ltd where the report according to financial report of KCB Bank Rwanda Ltd (2018), reported that return on assets of KCB Bank Rwanda ltd declined from 1.45% in 2015 down to 0.87% in 2018 and also the return on equity of KCB Bank Rwanda ltd declined also from 16.14% in 2015 down to 8.63% in 2018(KCB Bank Rwanda Ltd, 2018). In addition, the financial reports of BK also indicated that BK have experienced steady decline in profitability where according to BK report (2018), there is steady decline of return on equity of BK from 2016 up to 2018 where ROE of BK in 2016 was 19.13%, in 2017 was 19.02% while in 2018 was 14.06 % This is in addition to the decline of return on assets of BK where in 2016 was 3.25%, in 2017 was 3.21% while in 2018 was 3.12 %.

Related studies done in the past have focused on the various aspects of risk management in Rwandan commercial banks. For instance, Afriyie & Akotey (2012), Onaolapo (2012), Maina (2016), Shetty& Yadav (2018), Harelimana (2017) and Mbyayingabo (2018) studied on credit risk and operational risk. Most of the literature reviewed indicated that previous researchers only

concentrated on credit risks and operational risk leaving out the components of liquidity risk. The current study has a wider scope by covering additional important variables of liquidity, credit and operational risks that were omitted by previous studies. This makes the study more comprehensive. From survey of relevant literature, it has been found that there are few studies specific to Rwanda on the link of financial risk and profitability of commercial banks in Rwanda and they omitted control variable like Bank size. Study therefore intended to fill these gaps in literature by studying the controlling variable effect of bank size on financial performance of commercial banks in Rwanda. In addressing the research gaps, the current study sought to establish the effect of financial risk on profitability of commercial banks in Rwanda. Hence, this study seeks to investigate the effect of financial risk management on profitability of commercial bank in Rwanda with reference of selected banks in Rwanda stock exchange for the period of 2015- 2020.

1.3. Objectives of the Study

This study was guided by general and specific objectives

2.1. General objective

The General objective of this study is to investigate the effect of financial risks management on profitability of commercial banks in Rwanda with reference of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in Rwanda stock exchange

2.2. Specific Objectives

The specific objectives were:

1.To assess the effect of liquidity risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

2.To examine the effect of credit risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

3.To find out the effect of operating risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

4.To determine the effect of bank size on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

1.4. Research questions

This study was guided by the following research questions:

1. What is the effect of liquidity risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE?

2. What is the effect of credit risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE?

3. What is the effect of operating risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE?

4. What is the effect of bank size on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE?

1.5. Research Hypotheses

1.H_{o1}: There is no significant effect of liquidity risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

2.$H_{o2:}$ There is no significant effect of credit risk management on profitability of selected (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

3.$H_{o3:}$ There is no significant effect of operating risk management on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

4.H_{o4}: There is no significant effect of bank size on profitability of selected banks (Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd) in RSE

1.6. Significance of the study

Since, the ultimate objective of financial risk management implementation is to maintain profitability in the banking sector as aspects of risk management promote early warning system of monitoring relevant indicators; as well as stimulating and making provisions for possible realistic strains on the system by conducting stress testing. This helps regulators to monitor the system and prepare for ways to avert potential or discovered stress on the system hence establishing financial performance (Bikker & Metzmakers, 2015).

To the researcher**;** this study will help also the researcher to enrich the theoretical knowledge acquired thereby gaining practical experience from the field by confronting findings with the results come out to related theories. It is also a partial fulfillment of the requirements for the award of Master ’s Degree in Finance

To management of commercial banks**;** the findings of the study will be important to commercial banks because they will be able to understand general financial risk analysis and how they influence the profitability of the banks and how the same can be leveraged to achieve high profitability of banks.

The Management of Commercial banks will have advanced knowledge on risk management in commercial banks in Rwanda. This advanced knowledge will help them formulate and implement such important policies which will ensure that the effective risk management in

commercial banks increases the revenues and give the firm a competitive edge. They will also be able to address the outstanding challenges of effective risk management in commercial banks

The findings of the study will be important to the bank operational staff and management who will be able to understand the risk management practices that contribute to financial performance of commercial banks and ensure that they undertake acceptable banking practices and procedures and will also facilitate bank customers to understand and appreciate risk management practices instituted by banks so as to adhere to prudential banking practices.

The findings will provide insight in the most successful strategies banks use to handle credit risk that will assist the bank in formulating guidelines that will enhance Risk Management in the banking sector.

Academically, this work is one of the research projects that are going to be given to the UR library. Academicians will benefit from the information of the study as the study will contribute to existing body of knowledge. The study will further provide the background information to research organizations and scholars and identify gaps in the current research for further research.

1.7. Scope of the study

This study was delimited in content, geographical and time scope:

Content scope

The study focused on examining the effects of financial (liquidity, credit, and operational risks) risks analysis on profitability of commercial banks in Rwanda, a case of selected banks in Rwanda stock exchange. This topic is drawn in domain of financial management. The study was delimited on the concepts of financial risks analysis such as liquidity risks, credit risk and operating risk as independent variables and the study will be delimited to the concepts of

profitability of selected banks in Rwanda measured by return on Assets (ROA), return on Equity (ROE) and net profit Margin (NPM)

Geographical scope

The study used the data of financial statements of selected Banks from Rwanda Stock Exchange such as BK, I&M Bank Rwanda Ltd, Equity Bank Rwanda Ltd and KCB Bank Rwanda Ltd) all this banks their headquarter are located in Nyarugenge sector, Nyarugenge District in Kigali city.

Time scope

The research covers the period from 2015 to 2020. The period of 2020 has been choice because of availability of data. This period of 6 years has been taken into consideration so that anyone who may be interested on the effect of financial risk analysis on profitability of banks in Rwanda during the same period in other banks apart from BK, I&M Bank Rwanda Ltd, Equity Bank Rwanda Ltd and KCB Bank Rwanda Ltd

1.8 Organization of the study

This research is organized in five Chapters. Chapter one is an introduction and comprises the background of the study, statement of the problem, objectives of the study, research questions, significance of the study, and scope of the study. Chapter two is review of related literature and consists of theoretical literature, empirical literature review, critical literature and research gap identification, theoretical framework, conceptual framework, and summary. Chapter three is on the research methodology and covered research design, target population, sample size and sampling techniques, data collection tools, data analysis and then validity and reliability. Chapter four presents and discussed about the study findings while the last chapter provides the summary of the findings, the conclusion, recommendations as well as the suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter critically presents the models and other available literature relating to the study topic. The chapter is organized in three sections. The first section covers conceptual literature review of financial risk management and profitability, second section dealt with the theoretical framework on financial risk management and profitability and the third section covers the empirical studies on the effects of financial risk management on financial risk management and profitability and as well as research gap.

2.1. Conceptual literature review

This section deals with related literature review on the concepts of independent variable which are financial risk management and literature review on the concepts of dependent variable which profitability of commercial banks

2.2.1. Financial risk management

Financial risk management, according to Vickery (2006), is the activity of creating economic value in a company by employing financial instruments to manage risk exposure, notably credit risk and market risk. Foreign currency, interest rate, commodity, and stock risk are the four primary categories of market risk.

Financial risk management, like general risk management, necessitates identifying its sources, measuring it, and devising plans to address it. Financial risk is frequently defined as the unanticipated variability or volatility of returns, which includes credit risks, liquidity risks, and market risks (Greuning & Bratanovic, 2009). Thus, financial risk management practices are those activities and procedures used by managers to protect an organization from credit risks,

liquidity risks, and market risks. Credit risk management practices, liquidity risk management practices, and market risks are the three major categories of financial risk management practices (Kithinji, 2010).

Financial risks are classified into two types, according to Timothy and Yiuman (2016): traditional risks and banking risks. Traditional risks are commonly accepted threats arising from the balance sheet and income statement structure, such as credit and solvency risks. Treasury risks are those associated with a company's capital and include liquidity, interest rate, currency, and market risks. In recent years, the banking industry has emphasized the importance of financial risk management. This is due to the fact that they have a significant impact on business activities (Triantis, 2000).

Firms are exposed to various types of risk, which can be classified as operational risks or financial risks. Operational risks, also known as business risks, are associated with uncertainty about a firm's investments and investment opportunities, and are influenced by the product markets in which it operates. Unexpected changes in interest rates, exchange rates, and oil prices, for example, create financial risks for individual companies in addition to operational risks. Financial risks, as opposed to operational risks, which affect a specific firm or industry, are market-wide risks that can affect the financial performance of companies across the economy. Both types of risk exposure can have a significant impact on a company's value (Ofosu-Hene & Amoh, 2015).

The management of financial risks can be both qualitative and quantitative. Financial risk management, as a risk management specialization, focuses on when and how to hedge using financial instruments to manage costly risk exposures (Greuning& Bratanovic, 2009). It refers to

the practices and procedures that a company employs to reduce the amount of risk associated with its financial interests.

Outward financial risks stem from changes in financial markets, while in-house financial risks stem from within the organization itself. Uncertain factors such as transaction exchange, product prices, and interest rates can all be attributed to external financial risks (Schönborn, 2010). This research will evaluate five types of financial risks: interest rate risk, credit risk, capital management risks, liquidity risks, and foreign exchange risks. These are the major types of financial risks (Greuning & Bratanovic, 2009).

Commercial banks carry out financial risk management activities at various organizational levels, including the strategic level. This includes risk identification, risk assessment, risk measurement, risk monitoring, and risk control. The Board of Directors in commercial banks is ultimately responsible for financial risk management. As a result, the Board should outline financial risk management strategies as well as develop clear policies and procedures for risk management. Credit risk, liquidity risk, interest rate risk, and currency risk are examples of financial risks associated with the provision of banking services. The risks are then discussed in detail in the subsections that follow (Olusanmi et al., 2015).

There are numerous types of risks in the banking industry that affect bank profitability and operations. Risk is classified as either systematic (market) or unsystematic risk, as well as financial and non-financial risk. More specifically, these classes of risks include credit risk, liquidity risk, operational risk, market risk, political risk, currency risk, and strategic risk, among others (Timothy & Yiuman, 2016). This research only looks at credit risk, liquidity risk, and operational risk.

2.1.1.1. Credit risk management

The primary purpose of a bank's existence is to accept deposits as well as to grant credit, so it is inherently exposed to credit risk. Credit risk is the most significant risk that banks face, and the success of their business is more dependent on accurate measurement and efficient management of this risk than on any other risk (Greuning& Bratanovic, 2009). Other sources of credit risk include interbank transactions, foreign exchange, trade financing, futures swaps, options, bonds, and the extension of a commitment of guarantee. The Basel 1 committee's sound practices include establishing a credit risk environment for which the board of directors is responsible for periodically reviewing and implementing a credit risk strategy approved by the board of directors, and then setting procedures for controlling, monitoring and measuring credit risk (BCBS, 2009).

This is the uncertainty that comes with loan collection. Credit risk refers to the possibility that a bank's asset value, particularly its loans, will decline and become worthless. A non-performing loan is one that is not earning income and where full payment of principal and interest is no longer expected, the maturity date has passed, and full payment has not been made. The true credit risk is the deviation in portfolio performance from its expected value. As a result, credit risk is diversifiable but difficult to completely eliminate. This is due to the fact that a portion of the default risk may be caused by the systematic risk. Furthermore, despite the beneficial effect of diversification on total uncertainty, the idiosyncratic nature of some of these losses remains a problem for creditors. This is especially true for banks that lend in local markets and accept highly illiquid assets. In such cases, credit risk is difficult to transfer, and accurate loss estimates are difficult to obtain (Santomero, 2017).

Second, banks should follow reasonable credit-granting criteria, such as defining overall credit limitations at the individual borrower level based on exposure, and having a process for authorizing new credit extensions that is done at arm's length (Muhammed, 2012). Third, banks should continue to maintain an appropriate credit administration measurement and monitoring procedure, an administration system for monitoring overall credit portfolio composition, and build an internal risk rating system for managing credit risk. As a result, while evaluating credit and credit exposure, they should consider anticipated future changes in economic conditions. Banks should guarantee effective credit risk control by developing an independent on-going assessment system, ensuring credit issuance is correctly managed and within credit limits, and having early remedial action in place for worsening credits and similar employment situations. Character, capability, context, credibility, collateral, and circumstances are six credit management criteria that apply to banking institutions (Aduda & Gitonga, 2011).

The goal of a credit risk measuring system is to quantify the risk of losses caused by counterparty default. Credit risk management entails identifying, measuring, matching mitigations, monitoring, and controlling credit risk exposures to ensure that: the individuals who take or manage risks clearly understand it; the organization's risk exposure is within the limits established by the Board of Directors with respect to the current situation in the sector, group, and country; risk taking decisions are in line with the business strategy and objectives set by the BOD; the expected pa (Motlagh, et al.,2011).

In context of this study, effective management of credit risk is complicated. It is linked to the development of banking technology, which will enable to increase the speed of decision making and simultaneously reduce the cost of controlling credit risk. This requires a complete base of partners and contractors. Hence, Credit risk is one of significant risks of banks by the nature of

their activities. Through effective management of credit risk exposure, banks not only support the viability and profitability of their own business but also contribute to systemic stability and to an efficient allocation of capital in the economy.

Many commercial banks in Rwanda still facing the weakness in credit risk management has all along been cited as the main cause for bank problems (BNR, 2020). Since exposure to credit risk continues to be the leading source of problems in banks world-wide, banks and their supervisors should be able to draw useful lessons from past experiences. Banks should now have a keen awareness of the need to identify measure, monitor and control credit risk as well as to determine that they hold adequate capital against these risks and are adequately compensated for risks incurred. Hence, this study sought to examine the effect of credit risk on profitability of selected commercial banks in Rwanda Stock Exchange.

2.1.1.2. Liquidity risk management

Management of liquidity risk is the capability of financial institutions to enhance a balance between avoiding the problem of retaining excess liquid assets and at the same time ensuring that the bank does not run out of liquid assets to honor its financial commitments as they fall due (Afriyie & Akotey, 2012).The ability to retain assets that are easily transferrable is very much instrumental in enhancing stability in a financial system. Lack of adequate liquidity would result to failure of banks to meet their obligations when the need arise which would render the entire financial system unstable (Bwacha& Xi, 2017). Wrongly matching the flows of assets and liabilities is a major source of liquidity risks in banks. Customers' deposits have a short contractual period of maturity as compared to loans. Hence, management of liquidity requires a cushion to address projected withdrawals of deposits by customers (Kumar &Yaddav, 2013).

Muriayi et al., (2018) postulated that Management of Banks must stipulate strategic mechanisms in respect of the funding activities of banks by clearly outlining the combination of required liabilities and assets that should be employed to enhance adequate liquidity to meet their financial demands. The strategy should also deal with the innate risks related to liquidity that are associated with the primary functions of banks. A contingency plan of policies and procedures should also be maintained to help banks absorb shocks in an event where they are incapable to finance part or all of their activities on time and at an acceptable cost. It is challenging to develop a globally harmonized framework for managing liquidity risks given the differences in banks funding models and the diverse nature of market structures in various jurisdictions ((Onaolapo, 2012).

The techniques of liquidity risks management are constantly evolving to meet the demands of growing inconsistencies in different sources of funding. Managers who fail to develop strategies to meet prevailing circumstances would be adversely affected by funding difficulties. The steps of liquidity risks management entails establishment of strategic direction, integration of liquidity risk management as part of asset/liability management, maintaining a liquidity risk measurement system, track and monitor current capacity and projected liquidity position and periodically evaluating both the bank's financial position and prevailing trends in the financial market for emerging patterns and development of contingency liquidity plans (Santomero, 2017).

The Liquidity Coverage Ratio and Net Stability Funding Ratio are quantitative metrics that are meant to address two separate but complementary objectives in liquidity risks management by banks. The LCR aim to enhance resilience over short period of time by making sure that banks have high quality short term assets to withstand any acute situation that does go beyond one

month and the NSFR ratio helps to support resilience for long term period by ensuring that banks take advantage of secured source of funds to finance their activities (Ahmed et al., 2011).

Liquidity risk arises from the possibility that an organization will be unable to deal with uncertainty caused by variations in cash inflows and outflows. Banks are at risk of loan defaults, which might make it difficult for them to borrow capital to satisfy rising lending demand. Liquidity ratios, according to Maina (2016), are the total amount of funds a corporation has available to satisfy its maturing commitments. Firms with high debt levels and poor liquidity are more likely to fail than those with high debt levels and low liquidity.

From 2004 to 2008, Kithinji (2010) looked studied the impact of credit risk, as defined by the ratio of loans and advances to total assets and the percentage of non-performing loans to total loans and advances, on return on total assets in Kenyan banks. The majority of commercial banks' profits are unaffected by the amount of credit and nonperforming loans, according to the report. According to Kithinji, the banking industry's profits grew on average from 2004 to 2008. Commercial bank profitability, on the other hand, fluctuated over time, but on average improved modestly from 2004 to 2008. During the study period, profits were frequently low. The quantity of credit granted to consumers was quite considerable at the start of the period, but it gradually decreased. The amount of credit was high and relatively erratic, whereas the level of credit and earnings were relatively low and consistent. The Kithinji conclusion justifies taking into account additional elements that may have an impact on a bank's performance, as well as extending the study period to capture the true picture of the banks' performance. As a result, the impact of liquidity, market risk, and operational risk as components of financial risk were included in this study.

2.1.1.3. Operational risk management

Operational risk, according to Sewanyana(2015), is the risk of losses stemming from insufficient or failed internal processes, people, and systems, as well as external occurrences. Losses that are expected and those that are unexpected are two types of operational risk (Sewanyana, 2015).

The importance of operational risk management cannot be overemphasized. Inadequate operational risk management can result in unpredictable financial performances. It can also impact negatively on banks' revenues and erode banks' net worth, most importantly, it can have calamitous systemic consequences as was highlighted on the part alluded to have been played by operational risk in the 2008 financial crisis (Muriithi & Waweru, 2017).

Effective operational risk management will lead to lower capital charge, improved decision making, improved customer and staff satisfaction and improved regulatory compliance (Accenture, 2015). Effective management of operational risks will also assist in reducing operational losses, reduce compliance and audit costs, prompt identification of illegal activities and reduce exposure to future risks (Habib, Masood, Hassan, Mubin & Baig, 2014).

Effective operational risk management will also help banks to identify all the risks that they are exposed to, including those that they do not have the expertise or experience to manage, thereby helping them to put frameworks in place to reduce such risks and the associated impact if it crystallizes which in turn makes them less vulnerable to systemic problems (Barbu, Olteanu & Radu, 2008)

According to Kithinji(2010), operational risk management has become increasingly important in banks over the last decade. Large financial scandals, frauds, and information technology system failures are major motivators for banking institutions to pay more attention to their risk

exposures and internal risk management. The individual bank's vulnerability to various types of operational risk is not new, but as Gizaw et al., (2015) points out, the trend toward more reliance on technology, more intense competition, and globalization has left the corporate world more exposed to operational risk than ever before. For banks, the occurrence of a large "one-off catastrophe" in their regular operations could be far more harmful than credit losses resulting from the present financial market crisis. The bank's ability to appropriately analyze and control, or hedge against, the negative economic effects of such events, on the other hand, appears to be less developed than its credit and market risk management (Sewanyana,2015).

According to Hosna et al., (2009), good operational risk management necessitated the cooperation and participation of senior management, who could determine that operational risk was essential and merited attention, and the most important aspect was to allocate resources appropriately. Without their help, operational risk management will be pushed to the bottom of the priority list or will only be carried out to the regulatory body's bare minimum. One crucial element to remember is that senior management should play a key role in creating a corporate environment conducive to operational risk management (Hosna et al., 2009).

2.1.2. Profitability commercial banks

Commercial banks' ultimate purpose is profit. All of the methods devised, and activities carried out are aimed at achieving this lofty goal. This isn't to say that commercial banks don't have other objectives. Additional social and economic objectives could be pursued by commercial banks (Eljelly, 2013).

Commercial banks make money when they earn more money than they spend on overhead and taxes. The fees a bank charges for its services and the interest it generates on its assets account

for the majority of a bank's earnings. The interest paid on its liabilities is its largest expense. Loans account for the majority of a bank's assets and create the majority of its operational revenue. Most banks' portfolios are dominated by loans, which account for 50 to 70 percent of total assets (Okoth & Gemechu, 2013).

According to Nyanga (2012), profitability refers to an investment's ability to generate a profit from its utilization. This section explains how to calculate the percentage of total benefit expenses, which is the difference between revenue and total costs. The dimensions of the profitability variable, which include total expenditures, total income, and total profit, can be used to deduce this reasoning. Profits are critical to the success of any firm. It's a metric for determining how effective a corporation is at creating profits.

For many businesses, profitability is one of the most important components of financial reporting. Profitability is important to the firm's manager, shareholders, and other stakeholders interested or linked with the organization since it provides a clear indication of business performance. Profitability ratios are commonly used to assess a company's earnings over a period of time based on its sales, capital used, assets, and earnings per share (EPS). Profitability ratios are also used to assess a company's earning potential and are seen as a growth and success indicator (Madishetti & Rwechungura, 2013).

A bank's key assets are its loans to individuals, corporations, and other organizations, as well as the securities it owns, whereas its significant liabilities are its deposits and the money it borrows from other banks or sells in the money market. Commercial banks' profitability is measured using a variety of ratios, the most important of which are Return on Asset, Return on Equity, and Net Profit Margin (NPM) (Obamuyi,2013). Bank profitability is measured using fundamental

measures such as return on equity (ROE), net profit margin (NPM), and return on assets (ROA), which are usually expressed as a function of external and internal factors controlled primarily by bank managers' policy objectives and actions.

2.1.2.1 Return on Equity (ROE)

The return on equity (ROE) is a financial measure that compares a company's profit to the total amount of shareholder stock invested or located on the balance sheet. The return on investment (ROI) is what shareholders are looking for. A company with a high return on equity is more likely to be capable of earning cash on its own. As a result, the greater the ROE, the better the company's profit production. Abdullah, Parvez, and Ayreen (2014) go on to clarify that ROE is the ratio of Net Income after Taxes divided by Total Equity Capital. It is the rate of return on cash invested in the bank by the bank's stockholders. The return on equity (ROE) measures how well a bank's management uses its shareholders' money. As a result of the above assertion, the higher the ROE, the more effective the management is at utilizing the shareholders' cash. Diamond and Raghuram (Diamond and Raghuram, 2012)

Return on Equity (ROE) is a financial measure that compares a company's profit to the total amount of shareholder equity invested or located on the balance sheet (Ongore, 2011). According to Tarawneh (2006), the genuine measure of a financial institution's strength is the true measure of its return on equity, not its asset size, number of branches, or the pervasiveness of its electronics. As a result, the greater the ROE, the better the company's profit production. The indicator is determined thus:

$$\text{ROE}=\frac{net\quad profit}{Capital}\text{x}100$$

2.1.2.2 Return on Asset (ROA)

Another important number that reflects a bank's profitability is ROA. It's a proportion of income to total assets (Abdullah, Parvez and Ayreen, 2014). It assesses the bank's management's capacity to make profit by employing the company's assets. In other words, it demonstrates how effectively the company's resources are utilised to generate revenue. It also reflects how effective a company's management is at generating net income from all of the institution's resources (Abdullah, Parvez and Ayreen, 2014). According to Dietrich and Wanzenried (2011), a greater ROA indicates that the company is more efficient in its resource utilization.

The return on assets (ROA) is a key metric for determining a bank's profitability. It is a proportion of a company's income to its total assets (Khrawish, 2011). The return on assets (ROA) is a measure of how profitable a company's assets are in generating revenue (Susan et al., 2008). In other words, it demonstrates how effectively a company's resources are leveraged to generate revenue. According to Adusei(2015), a greater ROA indicates that a corporation is more efficient in its resource utilization.

The ROA is determined by the amount of fees that it earns on its services and its net interest income.Net interest income depends partly on the interest rate spread, which is the average interest rate earned on it assets minus the average interest rate paid on its liabilities. Net interest margin shows how well the bank is earning income on its assets. High net interest income and margin indicates a well managed bank and also indicates future profitability (Dawood, 2014). A high ratio indicates that the organization is able to make profits efficiently by utilizing its assets (Khrawish, 2011). The indicator's calculation formula is:

$$\text{ROA}=\frac{net\quad profit}{Asset}\text{x}100$$

The amount of fees it makes on its services and its net interest income are used to calculate the ROA. The interest rate spread, which is the average interest rate gained on assets minus the average interest rate paid on liabilities, is a factor in net interest income. The net interest margin (NIM) measures how successfully a bank earns money on its assets. A well-managed bank with a high net interest income and margin suggests future profitability (Dawood, 2014).

The methodology for assessing bank performance has evolved throughout time. Many banks utilized a strictly accounting-driven approach in the beginning, focusing on the assessment of net income, such as the computation of ROA. However, this strategy ignores the risks associated with the referred assets, such as transaction underwriting risks and the expansion of off-balance sheet activities. As a result, the riskiness of underlying assets is becoming increasingly relevant. Banks gradually realize that equity has become a limited resource. As a result, banks are focusing on the ROE, which is used to compare net profit to book equity in order to identify the most lucrative firm and make investments (Obamuyi, 2013).

2.1.2.3 Net profit Margin (NPM)

The net profit margin ratio, often known as net margin, is a profitability metric that determines what proportion of a company's revenue is turned into profit at the end of the year. To put it another way, it illustrates how much profit a company gets from each dollar of sales. Net margin is commonly used by investors and analysts to assess a company's management efficiency and anticipate future profitability based on management's sales forecasts. Investors can evaluate what percentage of revenues goes to operating and non-operating expenses, and what percentage is left over to pay shareholders or reinvest in the company, by comparing net income to total sales (Tarawneh, 2006).

A larger profit margin is usually preferable to a lower profit margin since it indicates that the company can convert more of its sales into profits at the end of the period. Keep in mind that profit margins vary greatly amongst industries, and just because one has a lower average profit margin than another doesn't indicate it's less profitable. Retailing, for example, may have a lower average margin than other businesses, but the sheer volume of sales compensates for it, making it more profitable in total dollars. The formula for calculating the net profit margin is to divide net income by total sales (Ghoneim & El-Tabie, 2014).

$$\text{Net profit Margin} = \frac{\text{Net income}}{\text{Total revenue}}$$

2.1.3. Bank size as control variable

The bank's ability to grow through profitability can be maintained up to a point beyond which it becomes unprofitable. Noninterest income diversification improves a bank's profitability. According to other studies, increasing the number of bank transactions does not always imply higher bank profitability (Acharya et al., 2016). As a result, they propose that an optimal amount of non-interest revenue activities be established.

Commercial banks are not all the same, and size appears to be a crucial factor in how they behave. To begin with, large banks are able to attract more deposits and lend more money than their smaller counterparts. Furthermore, large banks are more leveraged than smaller banks. Finally, compared to smaller banks, major banks rely more on short-term liquidity markets. Commercial banks' size is thus an important aspect in determining their overall financial performance. Devinaga (2010) incorporated market share as an external parameter in the profitability model. He reasoned that if commercial banks could increase their market share, they might as well be able to increase their income.

Market share can be leveraged to realize future economies or diseconomies of scale in the banking sector, according to Athanasoglou et al., (2018). As a proxy for a bank's market share, Devinaga (2010) emphasized that one must choose between deposits and assets, as both deposits and loans represent commercial banks' production.

Large banks, according to Shim (2013), are more diversified in their capital asset management and have easier access to capital markets than smaller banks. This demonstrates that small banks are more likely to fail than major banks. Substantial banks, according to Li (2013), are prone to hazardous lending operations that result in large losses and, as a result, failure. According to extant literature, business size is positively connected with financial performance; hence, larger organizations may attract more risk, and thus size may affect performance.

The size of a bank is a control variable that is calculated using the natural logarithm of total assets (Gul *et al*., 2011). In most earlier studies, the logarithm of total assets was used to calculate business size. This is the most accurate predictor of a company's size. Net fixed assets, total intangibles, total investments, net current assets, and other assets are all included in total assets. He claims that because the logarithm of total assets and the logarithm of sales have a high correlation (about 0.98), choosing one of them is equivalent to choosing the other.

2.2. Theoretical framework

This study is underpinned on two theory such as agency theory and finance distress theory as it strives to determine the success of financial risk analysis in promoting acceptable profitability by commercial banks in Rwanda. The discussion on this theory were detailed in the below sub-section.

2.2.1. Agency theory

Jensen and Meckling first proposed the agency hypothesis in 1976. Agency theory is a set of arguments for controlling a modern organization with a large number of shareholders or owners

who allow independent persons to control and guide the use of their collective money for future profits (Agbada& Osuji, 2013). The goal of the agency theory is to reduce the agency problem, which will result in increased value maximization. It establishes a clear link between financial risk management and profit. On the basis of agency theory, Meckling (1976) claims that a firm is made up of legally enforceable contracts between the owners of production factors and agents. The most typical issue between the principal and the agent is information asymmetry. The theory therefore suggests that to balance the demands of the parties' information flow between them must be enhanced.

The agency theory explains why companies should participate in risk management to address the conflicting interests of owners and management (Ofosu-Hene & Amoh, 2015). Managers often choose low-risk, low-return operations, whereas owners may desire the company to engage in high-risk projects that yield high profits and shorten the payback period on their investment. As a result, risk management is a crucial instrument for matching the interests and objectives of owners and management. As a result of asymmetries in earning distribution, the theory aids in identifying whether a probable mismatch of interest between shareholders, management, and debt holders can result in the organization taking too much risk or not investing in positive net value initiatives (Alshatti, 2015).

This theory demonstrates the need for management to operate in the best interests of the company's shareholders, who own it and have entrusted it to them. Management is responsible for determining the loan rate in order to guarantee that the amount of risk exposure is manageable and that changes in current inflation rates, as well as government lending and borrowing rates, have the least impact on an organization's profitability. This notion applies to the research in the sense that when the owner's demands are met, agency costs are kept to a

minimum. Agency fees can cause a company to have financial troubles, which can lead to liquidity hazards, which can jeopardize a bank's normal operations.

The agency theory is used to explain how agency (workers) will perform bank responsibilities in order to maximize the wealth of shareholders as principal, as well as how principal must understand the impacts of agency in order to avoid conflict of interest, which can lead to various financial hazards in banks. The theory supports top management's decision-making role in ensuring commercial banks and their employees adopt the best financing strategies and optimally utilize organizational resources to reduce the negative effects of liquidity risks, operational risk, and credit risk in order to improve commercial bank profitability in Rwanda.

2.2.2. Finance Distress Theory

According to Baldwin and Scott (1983), a firm is said to be in financial difficulty when its business has deteriorated to the point where it can no longer satisfy its financial obligations. Violations of debt payments and the failure or reduction of dividend payouts are the first signs of financial hardship. According to Ahmed et al. (2011), the first year in which cash flows are smaller than current maturities' long-term debt is when a person enters financial trouble. As long as the cash flow exceeds the present debt commitments, the company will be able to pay its creditors. The inability to satisfy contractual debt commitments is a crucial indicator of a company's financial difficulties.

Significant financial trouble, on the other hand, occurs well before default. According to Anas and Fauziah (2014), enterprises incur financial hardship as a result of economic distress, performance declines, and poor risk management. Berument and Dinçer (2004) illustrate a financial distress process that starts with an incubation period marked by a series of weak

economic conditions and inadequate management that makes costly mistakes. In the case of commercial banks, a liquidity crisis could occur if they are unable to supply cash to depositors and loans to borrowers on demand. When companies put risk management measures in place, they must also consider other creditors. Bank credit risks must also be managed because they might lead to financial distress. Loan portfolio management is a critical factor in determining a company's liquidity. In order to minimize financial turmoil, banks should manage credit and liquidity risk.

Many factors contribute to financial distress, including inability to pay debts when they are due, dividend reductions or nonpayment, and current liabilities aging faster than current assets. These actions may occur soon before payments are due for outstanding debts (Christine & Beverly, 2001). According to Coyle (2000), financial hardship is defined by adverse economic conditions combined with poor financial risk management. Commercial banks' ability to supply cash to investors, as well as conditions that cause depositors to rush to withdraw their funds, resulting in a bank run, should be closely monitored because this will put the bank in a liquidity crisis, posing a liquidity risk.

Finance Distress Theory is entangled in this study since it is based on a firm's liquidity and credit risk. This theory presents a non-biased viewpoint on the relationship between financial risk (liquidity risk, credit risk, and operational risk) and the study's profitability indicators. The theory provides a neutral platform to conduct an incisive empirical investigation of this relationship among the selected commercial banks in Rwanda Stock Exchange by providing information that the consequences of financial hardship occur prior to default risk.

2.3. Empirical review

There are prior studies conducted in different countries which are related to the topic/problem of this study. In order to show the research gap and justify the importance of this study the following section presents review of the empirical evidence that have examined financial risks and profitability of commercial banks. A number of studies have looked at financial risk management practices in different parts of the world. Some of these studies carried out in Rwanda and outside Rwanda are as follows.

2.3.1. Global empirical studies

Tafri et al. (2011) investigated the association between financial risks (credit risk, interest rate risk, and liquidity risk) and profitability of Malaysian conventional and Islamic banks between 1996 and 2005. They discovered that credit risk has a considerable impact on the profitability of both conventional and Islamic banks using panel data regression analysis with Generalized Least Squares fixed effects and random effects models. For conventional banks, the association between interest rate risk and ROE was found to be weakly significant, but for Islamic banks, it was found to be inconsequential. For traditional banks, interest rate risk has a major impact on ROA. They also discovered that liquidity risk had a negligible influence on profitability

Shetty and Yadav (2019) investigated the influence of financial risks on commercial bank profitability in India. This study looks at the relationship between financial risks and profitability of 43 Indian commercial banks over an 11-year period (2008 to 2018). This study employed a quantitative research approach, and the profitability indicators used were Return on Assets (ROA) and Return on Equity (ROE), and the financial hazards were Interest Rate Risk (IRR) and Foreign Exchange Risk (FER) (ROE) While the relationship between ROE and IRR was found to be weakly significant in this study's Time-Series Cross-Sectional secondary balanced panel

data regression analysis, the relationship between ROE and IRR was found to be weakly significant in this study's Time-Series Cross-Sectional secondary balanced panel data regression analysis and the impact of IRR on ROA is important for all commercial banks. The FER was determined to have a negligible influence on both profitability indicators. According to the findings, banks' profitability and financial risk have an inverse connection. As a result, Indian commercial banks, in collaboration with bank supervisors, should strike a balance between profitability and financial risk.

Liquidity was a crucial aspect during the 2008-2009 financial crises, according to Bordeleau and Graham (2010), who researched the impact of liquidity on bank profitability in Canada. Based on data from a panel of Canadian and American banks from 1997 to the end of 2009, the study discovered that banks with some liquid assets have higher profitability. Commercial banks have two main goals in managing their portfolios, according to the report, which may contradict. The first goal is to keep a supply of liquid assets in case their cash is depleted, and the second is to maximize earnings by earning a high return on their assets. They give empirical findings for a panel of Canadian and American banks from 1997 to 2009 on the relationship between liquid asset holdings and profitability. The findings imply that there is a nonlinear relationship between bank profitability and liquid asset holdings; nevertheless, there is a limit beyond which keeping more liquid assets reduces a bank's profitability, all else being equal.

Li and Zou (2014) investigated the influence of credit risk management on commercial bank profitability: a European case study. The primary goal of the study is to see if there is a link between credit risk management and commercial bank profitability in Europe. We also want to see if the relationship is steady or if it is changing. ROE and ROA are proxies for profitability in the study model, whereas NPLR and CAR are proxies for credit risk management. From 2007 to

2012, data was collected from 47 of Europe's top commercial banks, and four hypotheses were developed in response to the research question. In order to see if the association exists, a set of statistical tests are run. Other statistical tests are used to determine whether or not the link is stable. The data show that credit risk management has a favorable impact on commercial bank profitability. Between the two credit risk management proxies, NPLR has a considerable impact on both ROE and ROA, whereas CAR has a negligible impact on both. From 2007 to 2012, however, the correlations between all of the proxies were not consistent, but rather fluctuated.

2.3.2. Empirical studies in African countries

Eneyew (2013) conducted research on the financial risks and profitability of Ethiopian commercial banks. The goal of the study was to look at the influence of financial risks on commercial bank profitability for a total of eight commercial banks in Ethiopia from 2000 to 2011. To accomplish this, the study used a mixed methods approach, combining documentary analysis with in-depth interviews. The study examines the financial records of eight Ethiopian commercial banks, as well as important data on macroeconomic issues. Credit risk and liquidity risk have a negative and statistically significant link with bank profitability, according to the study's findings. Interest rate risk and foreign exchange rate risk, on the other hand, are determined to be statistically insignificant. According to the report, focusing on credit risk management and maintaining an appropriate level of liquidity that allows banks to meet contractual obligations could help Ethiopian commercial banks maximize their return on assets.

In Ghana's Brong Ahafo Region, Afriyie (2012) investigated the influence of credit risk on the profitability of rural and community banks. The study analyzed the financial statements of ten rural banks from 2006 to 2010 (a five-year period). For the estimation, a panel regression model was used. Non-Performing Loans Ratio (NLPR) and Capital Adequacy Ratio (CAR) were

utilized as credit risk management indicators in the model, while Return on Equity (ROE) and Return on Asset (ROA) were employed as profitability indicators. The findings revealed a significant positive relationship between non-performing loans and rural bank profitability, indicating that while loan losses are higher, banks are still profitable. He discovered a link between credit risk management and profitability in a number of Ghanaian rural banks. Rural banks with a greater capital adequacy ratio can extend more loans and absorb credit losses more effectively, resulting in increased profitability. However, other factors, particularly in rural areas, can have an impact on bank financial performance. Factors such as poor income, lack of access to formal financial services, and a lack of information or awareness exist in rural areas. Most of the banks that do well have their headquarters in cities, and if all of the banks were included, the research would have yielded higher results.

Kargi (2011) examined the influence of credit risk on Nigerian bank profitability. Financial ratios were extracted from annual reports and accounts of sampling banks between 2004 and 2008 and examined using descriptive, correlation, and regression techniques. Credit risk 28 management has a substantial impact on the profitability of Nigerian banks, according to the data. It was established that the amounts of loans and advances, nonperforming loans, and deposits have an inverse relationship with bank profitability, putting them at danger of illiquidity and distress.

Simamora and Oswari (2019) investigated the impact of credit risk, operational risk, and liquidity risk on the financial performance of Indonesian stock exchange-listed banks. The goal of this research was to see how credit risk, operational risk, and liquidity risk affected the financial performance of banks listed on the Indonesian stock exchange from 2009 to 2017. The participants in this study were banking businesses that were listed on the Indonesian Stock

Exchange between 2009 and 2017. A total of 5 samples were used, all of which were gathered using a purposive sampling strategy. The analysis technique was multiple linear regression, and the research method was quantitative with an associative approach. The research result showed that credit risk had no effect on financial performance. Operational risk had significant negative effect on financial performance. Liquidity risk had significant negative effect on financial performance.

2.3.3. Empirical studies in Eastern African Countries

Muriayi et al. (2018) conducted research on Financial Risks Analysis and Commercial Bank Performance in Kenya. The goal of the study was to look into the impact of financial risks on the performance of Kenyan commercial banks. The study's goal was to see how liquidity risk, credit risk, interest rate risk, and foreign exchange risk affected commercial banks' asset returns in the country. The study used an explanatory research approach and was based on corporate risk management theory. Secondary data from 42 commercial banks was collected over six years from 2010 to 2015 to examine their financial performance in terms of return on assets. Annual reports and financial statements from commercial banks and the Kenyan Central Bank served as the source data, which was examined using a statistical panel data model. Liquidity risk and asset return are positively and strongly associated (=0.039, p=0.000), Credit risk was adversely and substantially associated to return on assets (=-0.014, p=0.041); interest rate and return on assets were favorably and strongly related (=0.002, p=0.000); and foreign exchange risk was negatively and significantly related to return on assets (=-0.003, p=0.000). Liquidity risk and interest rate have a positive and substantial effect on performance, whereas credit risk and exchange risk have a negative and significant effect on performance of commercial banks in Kenya, based on the findings and conclusion, the study recommended that commercial banks to have a sound process

for measuring, identifying, controlling and liquidity risk. It is essential that banking corporations have a comprehensive risk management process in place and that is subject to appropriate board and Senior Management oversight.

Maina (2016) investigated the effects of financial risk management on commercial banks' financial performance in Kenya. The goal of the study was to see how financial risk management affected the financial performance of Kenyan commercial banks. Over a five-year period, this study used a descriptive research approach to investigate the hypothesis (2011 to 2015). The participants in this study were the 43 commercial banks in Kenya as of December 31, 2015. For the five-year period, secondary data was acquired from the 43 commercial banks' audited financial accounts. The data acquired in this study was analyzed using descriptive statistics. The study also discovered that bank deposits and liquidity risk (P=0.00), bank deposit and capital management risk (P=0.031), bank deposit and interest rate risk (P=0.000), liquidity risk and capital management risk (P=0.013), liquidity risk and bank size (P=0.001), capital management risk and bank size (P=0.000), capital management risk and interest rate risk (P=0.046) were significant predictors of financial performance. However, the analysis found that credit risk and foreign exchange risk had no significant relationship with any of the variables (P>0.05). The study recommends that a research should be done on relationship between financial risk management and financial performance of Micro Finance Institution in Kenya and the study recommends that a study should be done on the challenge facing commercial banks in Kenya in management of financial risk management.

Siba (2012) did a study with an aim of finding out the link between financial risk management practices and financial performance of commercial banks in Kenya performance. The primary data was collected via a questionnaire, while secondary data was taken through the CBK yearly

supervision reports. The survey found that all Kenyan banks have formal risk management systems in place, as well as 25 other risk management frameworks. He discovered that the banks had developed equivalent internal controls and employed acceptable risk monitoring and information management systems. The responsibility for determining, managing, and limiting risks, as well as the backup of system and data files, differed amongst banks. According to the findings, banks had extremely effective risk management processes, and there was a clear link between commercial bank performance and risk management efficiency. The study was conducted prior to the publication of uniform risk management guidelines for the banking industry and did not identify the effects of various correlation variables in enhancing financial performance of commercial banks.

Musiega (2018) investigated the impact of financial risk on the financial performance of Kenyan commercial banks. The study's main goal was to investigate the impact of financial risk on commercial bank performance in Kenya. The study incorporated both primary and secondary data. The positivist research philosophy was used in this study, and a descriptive survey research design was used. Secondary data was collected from Kenya's 44 commercial banks, two of which were in receivership and one under statutory administration. The central bank of Kenya and the banks' websites provided panel data for 30 commercial banks with data spanning a ten-year period from 2006 to 2015. The population for primary data was 220 respondents, which included risk managers, operations managers, general managers, and credit managers. A self-administered survey was employed. Secondary data was analyzed with descriptive statistics, correlation analysis, and random and fixed effects using E-views software, whereas primary data was analyzed with descriptive statistics, correlation analysis, and factor analysis, correlation, and regression using SPSS-v 22. Credit risk had a significant negative relationship with performance,

implying that managers should aim to reduce this risk in order to improve performance. Market risk and interest rate risk, on the other hand, had a significant positive relationship with performance, implying that managers should expect an increase in performance as interest rates and foreign exchange rise.

Lyambiko (2015) conducted research on the impact of operational risk management strategies on financial performance in Tanzanian commercial banks. The goal of this research was to determine the impact of operational risk on the financial performance of Tanzanian commercial banks. As of December 31, 2013, the entire population comprised of all 36 commercial banks in Tanzania. Because the study's population was tiny, there was no need for sampling, hence the entire population was employed. The study relied on secondary data obtained from the Bank of Tanzania and all commercial banks, resulting in a census study. The study used a descriptive survey of Tanzanian commercial banks. From 2009 to 2013, secondary data was gathered from financial reports of Tanzanian commercial banks. A regression analysis was used to determine the impact of operational risk management on the financial performance of Tanzanian commercial banks. The study's findings indicated that independent variables such credit risk, insolvency risk, and operational efficiency had various degrees of link with commercial banks' financial performance in Tanzania. The study also found that operations risk management has a beneficial impact on commercial bank returns in Tanzania. The efficiency of operations was also shown to be positively connected with the financial performance of Tanzanian commercial banks in this study on the other hand, the credit risk and insolvency risk rates, had a negative impact on commercial banks' financial performance in Tanzania. This study concluded that commercial banks should manage their risk factors effectively, as changes in risk factors such as operational

risk cause currency depreciation and have an impact on the performance of commercial banks listed on the DSE.

2.3.4. Empirical studies in Rwanda

Harelimana (2017) investigated the impact of risk management on the financial performance of Rwandan banking institutions. The purpose of this research is to evaluate the impact of risk management on financial performance in Rwandan institutions: a case study of Unguka Bank Ltd from 2012 to 2016. The information was gathered using both quantitative and qualitative methodologies in a questionnaire created for 30 members of Unguka Bank Ltd's workforce. Interviews were performed with key informants, such as employees of Unguka Bank Ltd. according to the findings, Credit risk, operational risk, interest rate risk, and liquidity risk are the factors of risk management in Unguka Bank Ltd. The results demonstrate that Unguka Bank Ltd was profitable during the covered period since the standard ratio of return on asset was 1%. Several variables contributed to this profitability, but the key element was the quality of service. The four independent variables were shown to moderately predict Unguka bank Ltd's performance, implying that the model explains 69.5 percent of the variance in Unguka bank Ltd's performance. The linear regression F-test results (F = 8.741; and 5df) are significant at p 0.05, confirming the hypothesis. The study conducted a multiple regression analysis so as to determine the regression coefficients (β) which shows that β0=10138 and which means that all the independent variables have a significant contribution to Unguka bank Ltd-Nyarugenge branch.

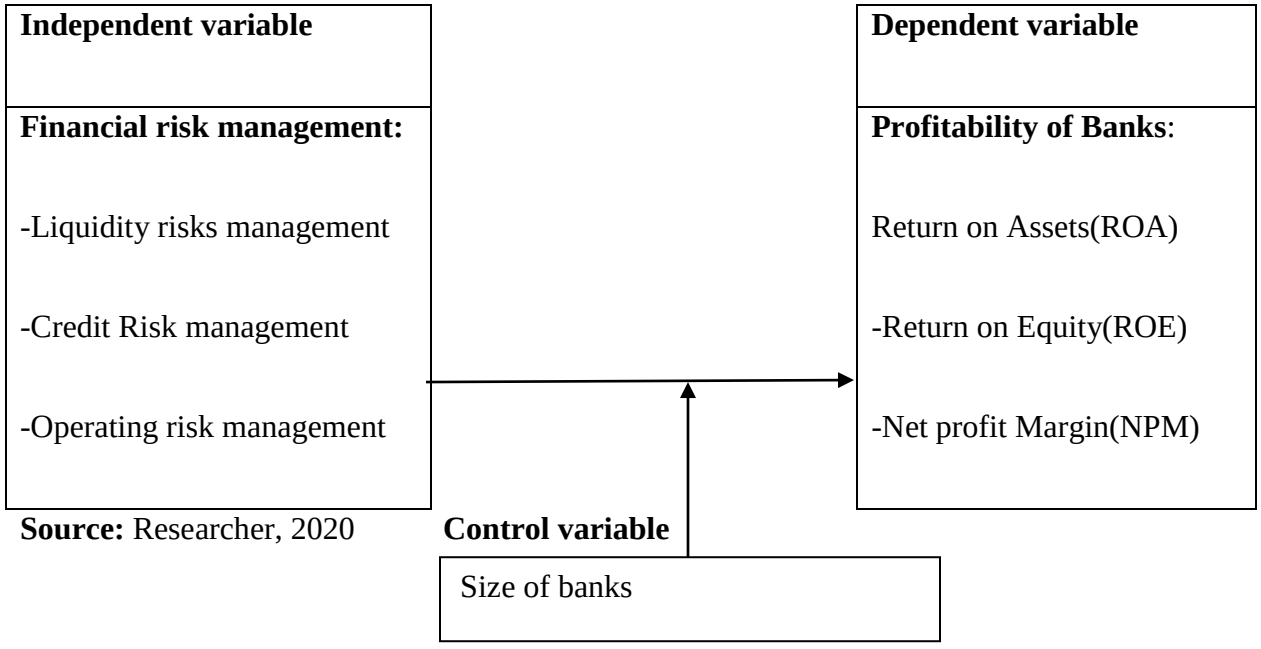
Ugirase (2013) investigated the impact of credit risk management on commercial banks' financial performance in Rwanda. The goal of this study was to determine the impact of credit risk management on commercial banks' financial performance in Rwanda. The study's four specific goals were to determine how credit risk identification, credit risk analysis and assessment, credit

scoring mechanisms, and risk monitoring affect commercial banks' financial performance in Rwanda. The study used a descriptive research approach to investigate the relationship between commercial bank regulation and financial performance. Eleven commercial banks made up the study's sample size and population. Except for risk monitoring, the study's general finding and conclusion was that all of the credit risk management indicators utilized in this study are extremely significant predictors of financial performance of commercial banks in Rwanda. Credit risk identification was found to be important in explaining commercial bank performance in Rwanda. The importance of credit risk score and credit analysis and evaluation in explaining financial performance was also discovered. Another study in Rwanda could be undertaken based on the findings, but it should really clarify and expand the variables of credit risk management that affect commercial bank financial performance. Credit risk management is a critical component of financial institution operations in Rwanda, as well as a cornerstone of financial success and stability. The study recommends the Government of Rwanda to develop policy and legal environment that is conducive to association of financial institutions.

2.4. Conceptual framework

Conceptual framework provides configuration and content for the whole study (Vaughan, 2008). Kombo and Tromp (2009), describe a concept as an abstract or broad idea inferred or resulting from definite instances. Additionally, they defined a conceptual framework as a set of extensive ideas and philosophy taken from pertinent areas of study and used to constitute a subsequent presentation. A conceptual framework is the diagrammatic presentation of variables, showing the relationship between the independent variable, moderating variable and the dependent variables. In this study, the independent variable is financial risk analysis which includes liquidity risks, credit risk and operating risk, the control variable is size of banks because banks size is among

elements of bank characteristics which is determine the profitability of banks where large banks should take advantage of economies of scale to get cost advantages which coupled with improved operational efficiency will lead to more profits (Adusei, 2015) and A research conducted by Chaibi, Alioui & Xiao (2015) , fond that Small firm tend to generate less return compared to the large one and vice versa. Also they indicate that the price index for big firms showed higher level of performance than small one. Interestingly, they envisaged that the risk differences cannot be associated to explain the high performance for small firm. The firms with high value tend to perform very well than firms with a small value during the study period. The study seeks to understand how these independent variables determine the level of profitability of selected Banks in Rwanda stock Exchange which is the dependent variable as shown in figure 2.1.



Source: Researcher, 2020

Figure2.1: Conceptual framework

2.5. Research gap

The review of the literature discussed in this chapter reveals the existence of many gaps of knowledge in this regard, particularly in the context of Rwandan context. To my knowledge the above-mentioned issue has not been adequately investigated in selected commercial bank in Rwanda stock exchange. Although a very limited number of studies such as Mbyayingabo (2018), studied on the relationship between operational risk management practices and fraud mitigation in banking institutions in Rwanda for one commercial bank and his study did not mention the effect of other risk like credit risk and liquidity risk on profitability of selected commercial banks in Rwanda stock exchange

Ugirase (2013), did the study on the effect of credit risk management on the financial performance of commercial banks in Rwanda but fail to highlight the effect of operational risks and liquidity risk on profitability of commercial banks. Musiega(2018), conducted influence of financial risk on financial performance of commercial banks in Kenya appear to that his study focus only market risk and interest rate risk on it affect overall financial performance but fail to incorporate how credit risk, operational risk and liquidity risk affect profitability of commercial banks.

Although the past studies have used regression analysis to show the effect of liquidity risk management and profitability, Moreover, there are contrasting results and even if the studies were done in different regional locations there is need for a similar study in Rwanda so as to test role of liquidity risk management strategies on profitability among profit making organizations. Therefore, it is with these considerations in light that the present study intends to identify the various risks which commercial banks are exposed to while at the same time try to provide

alternative solutions which will be beneficial to the various players in the financial sector with more emphasis on commercial banks.

Research gaps exist since none of the studies address in detail the effectiveness of financial risk analysis such as credit risk, operational risk and liquidity risk and the impact that it has on the profitability of selected commercial banks in Rwanda stock exchange. Also, majority of the studies were either done to establish the connection between financial risk management and financial performance. Research Credit Risk, Interest Rate Risk, Foreign Exchange Risk, Capital Management risk, Liquidity Risk and Financial Performance gaps also exist as this research provided more literature for examining the theories reviewed. This study interested to fill the existing research gap by answering the following research question, is financial risk management effective in promoting the profitability of commercial banks in Rwanda? The above chapter reviews the various theories that inform financial risk management and financial performance. Also, an empirical investigation has been conducted where past studies, both global and local were reviewed. It is from these critiques that the research gap has been identified.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

This chapter focuses on the research methodology which integrates the various techniques that used for the study for the purpose of achieving the research objectives. It takes into account issues such as the research design, sampling design, profile of the study, population of the study, sample size, sampling technique, data collection procedure, validity and reliability, data processing and analysis, ethical consideration and finally limitation of the study.

3.1. Research Design

Since the aim of this study is to investigate the effect of financial risks management on profitability of commercial banks in Rwanda with reference of selected banks in Rwanda stock exchange, the researcher adopted quantitative research design. In quantitative research your aim is to determine the relationship between one thing (an independent variable) and another (a dependent or outcome variable) in a population. The quantitative research design the study that was used is sub-divided into three research design, which are longitudinal research design, descriptive research design and explanatory research design

Longitudinal research design: Longitudinal research design was used by researcher to conducts several observations of the same subjects over a period, sometimes lasting several years while employing secondary data for analysis. The study relied purely on accounting data of selected

commercial banks in RSE for the period of 2015 to 2020. The required data on the variables were extracted from audited annual reports of the firms under consideration

Descriptive research design: Descriptive research design was used to describe the variable under the study such as financial risk management includes liquidity Risk management, credit Risk management, operating risk management as independent variable and profitability of Banks such as return on Assets (ROA), return on Equity (ROE), net profit Margin (NPM) as dependent variable and banks size as control variable by using quantitative approach such as descriptive statistics and financial ratios analysis

Explanatory research design: Explanatory research design or causal research design was used to establish the effect of liquidity risks management, credit risk management, operating risk management and bank size on profitability of selected banks in RSE by using multiple linear regression approach.

3.2. Target Population

Population of this study is comprised of all active commercial banks in Rwanda both locally and foreign listed at Rwanda stock exchange between the period of 2015 and 2020. During this period there are 4 banks that were accepted by central Bank of Rwanda to operate in registered by Rwanda stock Exchange and the data was collected from financial statements of Bank of Kigali, I&M Bank Rwanda, Equity Bank and KCB Bank Rwanda Ltd

3.3. Sampling design

This section dealt with sample size and sampling technique

3.3.1. Sample size

The sample size for this study was equal to financial statements of 4 commercial banks listed in Rwanda stock exchange which are BK, I&M Bank Rwanda Ltd, Equity Bank and KCB Bank Rwanda Ltd for the period of 2015 up to 2020.

3.3.2. Sampling technique

The researcher used universal sampling technique for selecting all financial statements of 4 commercial banks listed in Rwanda stock exchange from the period of 2015 up to 2020.

3.3.2.1. Universal sampling technique

Universal sampling technique entails the incorporation of all the individual elements with similar characteristics in the study. This approach was justified as the population was considerably small, making it tenable to accomplish the study within considerable timelines. The researcher used universal sampling technique where sample size is equal the total population for selecting financial statements of 4 commercial banks listed in Rwanda stock exchange (BK, I&M Bank Rwanda Ltd, Equity Bank and KCB Bank Rwanda Ltd) from the period of 2015 up to 2020.

3.4. Data collection instruments

The researcher utilized secondary data. Audited income statements, statement of financial position and cash flow statements was collected from the commercial banks websites. Since it is a requirement that all commercial banks submit annual report to Rwanda stock exchange, it was easier for the researcher to obtain this data and use it to assess the effect of financial risks on profitability of commercial banks in Rwanda. The data was collected for the period of 6 years from 2015 to 2020. The panel data was consisted of time series and cross sectional data. Cross sectional data represented four selected commercial banks in Rwanda stock exchange while time series data represented the period from 2015 to 2020

3.5. Operationalization and measurement of variables

Liquidity risk management: Liquidity risk management is measured by liquid assets to total assets for each of 4 commercial banks in Rwanda stock exchange for the period 2015 to 2020

Credit risk management: Credit risk management is measured by non-performing loans to total loans for each of 4 commercial banks in Rwanda stock exchange for the period 2015 to 2020

Operating risk management: Operating risk management is measured by operating expenses to net operating income ratio) for each of 4 commercial banks in Rwanda stock exchange for the period 2015 to 2020

Bank size: Banks size is measured by Natural logarithms of total assets for each of 4 commercial banks in Rwanda stock exchange for the period 2015 to 2020

Return on assets: Return on assets (ROA) is measured by using net profit divided by total assets of company

Return on equity: Return on Equity (ROE) is measured by using net profit divided by total equity of company

Net profit margin: Net profit margin is measured by using net profit divided by total sales (revenue).

3.6. Validity and reliability of results instrument

3.6.1. Validity

Since the data was used are secondary data from 2015 up to 2020 in regarding to financial risk management and profitability of commercial banks selected in Rwanda stock exchange which are BK, I&M Bank Rwanda Ltd, Equity Bank and KCB Bank Rwanda Ltd was obtained it

means that there no missing data. Since the data was used are secondary data from 2015 up to 2020 in regarding to Financial risk and profitability of selected commercial banks was obtained it means that there no missing data. Hence the validity index was 100 percent.

3.6.2. Reliability

Reliability was used to check internal consistency of data. The method was found to be more reliable for data collection since there was no biasness noted. The answers were submitted to a reliability analysis (with SPSS) for computation of the Cronbach's Alpha. According to Sekaran (2010) Alpha values for each variable under study should not be less than 0.7 for the statements in the Instruments to be deemed reliable. Since, the data collected come from Audited income statements, statement of financial position and cash flow statements and this study is consistent to all research. There is no need of computing reliability index (Alpha values).

3.7. Data processing

Data processing refers to certain operations such as editing, entry and tabulation.

3.7.1. Editing

The researcher sorting needed elements in financial statements of selected commercial banks in Rwanda stock exchange such as total assets, liquid assets, Non-performing loans, total loans, operating expenses, net operating income ratio, total equity, net profit margin and total revenue which allowed the researcher to compute the financial ratios and profitability ratios such ROA, NPM and ROE.

3.7.2. Data entry

In this research, the first keyboard operator (the researcher) manually keyed in the data into a computer program and also the researcher verified the data entered to ensure accuracy before the

data was ready for analysis. The software program SPSS for Windows (Version 20.0) and Excel was used in this process.

3.7.3. Tabulation

Tabulation is a part of the technical procedure wherein the classified data are put in the form of tables. It is used for summarization of data in its micro form. It helps in the analysis of trends, relationship and other characteristics of a given data. Simple tabulation is used to answer question related to one characteristic of the data whereas complex tabulation is used to present several interrelated characteristics. Complex tabulation results in two ways, three way tables which give information about two or three inter-related characteristic of data. The following points may be kept in mind while constructing a table.

3.8. Data analysis

Data analysis techniques entailed descriptive statistics, trend analysis and inferential analysis includes correlation and regression analysis

Descriptive statistics: This study used a descriptive statistical method for representing and summarizing of the bio data. Descriptive statistical measures were used to depict the centre, spread, and shape of distributions and are helpful as preliminary tools for data description. It involves use of percentages, mean and standard deviation.

Correlation analysis: Correlation analysis was developed to measure the strength and closeness of the relationship between each independent variable to dependent variable which is the relationship between financial risk management such as (liquidity Risks, credit Risk and operating risk) and profitability of banks selected from Rwanda Stock Exchange. The analysis is the initial step in determining the relationship existing between the independent and dependent

variables in statistical modeling. A correlation matrix was developed before carrying out the multiple regression analysis. The relationship between the independent variable is analyzed to assist in developing a prediction multiple model which reveals relationship non-existence where the correlation value is 0. When the correlation is ±1.0 it means a perfect negative or positive relationship exists (Zikmund, 2010). The values interpretation states that at between 0 there is no relationship and 1 means there is a perfect relationship.

Multiple linear regressions: With multiple regression analysis, we can assess the effects of multiple predictor variables (rather than a single predictor variable) on the dependent measure. A multiple regression model was used to test the significance of the effect of the independent variables on the dependent variable. Based on other models that have been used to test the effect of each predictor such as liquidity Risks management, credit Risk management and operating risk management on profitability of selected Banks from Rwanda stock Exchange (RSE)**.** Analytical model that tested and estimated the effect of financial risks management on profitability of commercial banks in Rwanda using panel data is as follows:

$$Y = \beta 0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_{3+}\beta_4 x_{4+}e$$

Where: Y = profitability of commercial banks measured by ROA, ROE and NPM

, {βi; i=1,2,3,4} = The coefficients representing the various independent variables. B_0 = the Y intercept

{Xi; i=1,2 and 3} = Values of the various independent (covariates) variables while X4 is Control variable

e = the error term which is assumed to be normally distributed with mean zero and constant variance,

X1 = Liquidity risk management

X2=Credit risk management

X3=Operating risk management

X4= Size of banks

Test statistical: Inferential statistics measures was used to test statistical hypothesis (specific objectives). This study adopted the customary confidence level in many statistical tests of 95%, which means a customary significance level (p-value) of 5%. That is, statistically significant correlations between variables are only those with p-value below 5%. Pearson correlation coefficient has been used to measure the strength of the association between dependent and independent variables. T-test was used to establish the significance of this correlation coefficient. The regression models were run to test whether the model is significant or not. The statistical significance was verified by the Coefficient (β), t-statistic and Prob. In additional, statistically significant relationship between the dependent variable which are profitability of selected commercial banks in Rwanda stock Exchange and independent variable which are liquidity Risks management, credit Risk management and operating risk management from the model was accepted at 5% significance level.

3.8.1. Diagnostic Tests

After running the model, post-estimation tests were conducted to ensure that the model was a good fit and the estimates received from the model were efficient and reliable. This study satisfactorily performed conditional diagnostics statistical tests. The study tested for normality, Autocorrelation, heteroscedasticity and multicollinearity.

3.8.1.1. Normality

Normality is important in knowing the shape of the distribution and helps to predict dependent variables scores (Paul & Zhang, 2010). Tests of normality were performed to ascertain whether the data was modelled properly and that the distribution is normal (Gujarati, 2009). Referring to what Ghasemi and Zahediasl (2012) mentioned, the variables are supposed to be roughly normally distributed especially when the findings are beyond the sample. In this respect, the research used Kolmogorov-Sminorv tests, where if the normality tests yield a score that is less than 0.05, then the data was not distributed normally.

3.8.1.2. Autocorrelation

According to Zovko (2008), autocorrelation also known as serial correlation or lagged correlation is used to determine the strength of relationship of a variable with its own past and present values, or in other words, it can explain as correlation of the error term in the present with the error term in the past. Autocorrelation can happen whether in the time series data or cross-sectional data. Normally, autocorrelation problem is caused by internal and external. Internal is due to the distribution of the error term of a true specification of a model and external is due to the wrong functional form or omitted important variables. In order to test the autocorrelation problem, Breusch-Godfrey serial correlation, Lagrange multiplier test or Durbin Watson h-test can be used to detect the presence of the problem. But the LM test was opted as it has a better explanation on the higher AR model which is the AR (2) and Durbin Watson h-test is biased for the autoregressive moving average models so it is a chance that the autocorrelation is underestimated at the first place (Wealliem, 2009)

3.8.1.3. Multicollinearity

Multicollinearity is the undesirable situation where the correlations among the independent variables are strong (Corbin *et al*., 2014). Variance Inflation Factors (VIF) and tolerance values

were used to test for multicollinearity consistent (Saunders & Thornhill, 2012). Cohen *et al*. (2004) define Variance Inflation Factor (VIF) as the amount's index that the variance of each regression coefficient is increased relative to a situation in which all of the predictor variables are not correlated and suggested a VIFs of 5 or more to be the rule of thumb for concluding VIF to be high, hence not appropriate. This implies that two or more variables have a Variance Inflation Factor (VIF) of 5 or above, amongst them one should be eliminated from the regression analysis as this shows that there is multicollinearity.

3.8.1.4. Heteroscedasticity

Heteroscedasticity means a situation in which the variance of the dependent variable varies across the data, as opposed to a situation where Ordinary Least Squares, OLS, makes the assumption that $V(\varepsilon j)=\sigma 2$ for all the j, meaning that the variance of the error term is constant (homoscedasticity). Heteroscedasticity complicates analysis because many methods in regression analysis are based on an assumption of equal variance (Baguley, 2012). Hence to test for normality and heteroscedasticity of regression residuals, this study used SPSS version 22.0 software.

3.9. Ethical consideration

The researcher therefore takes in consideration all ethical issues. The researcher respects anonymity, privacy, vulnerable groups and confidentiality so as to get required information without harming any of people who authorized to get data of financial reports of selected commercial banks available on their website. The researcher also was acknowledging all quoted text in order to avoid plagiarism.

3.10. Limitations of the study

The study was limited by lack of adequate information. The selected commercial banks from Rwanda Stock Exchange level of information disclosure differed. To cope with this challenge, the researcher approached the banks with scanty information seeking clarification on corporate governance practices not disclosed.

The scope of this research was for five years 2015 up to 2020. It has not been determined if the results would hold for a longer study period. Furthermore, it is uncertain whether similar findings would result beyond 2020. A longer study period is more reliable as it taken into account major economic conditions such as booms and recessions

For data analysis purpose, the researcher applied a multiple linear regression model. Due to the shortcoming involved when using regression models such as erroneous and misleading results when the variable values change, the researcher cannot be able to generate the findings with certainty. If more and more data is added to the function regression model, the hypothesized relationship between two or more variable may not hold.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter presents data analysis, results and discussion. The data used in this study has been analyzed using descriptive and quantitative research techniques. This is to enable the performance of the multivariate regression analysis on the panel data that has been collected for this particular study. The data used in this study has been sourced mainly from secondary data sources. This chapter specifically, seeks to answer and accomplish the research questions and objectives as stated in chapter one of to assess the effect of liquidity risks management on profitability of selected banks in RSE; to examine the effect of credit risk management on profitability of selected banks in RSE; to find out the effect of operating risk management on profitability of selected banks in RSE and to determine the effect of bank size on profitability of selected banks in RSE. The study reanalysis diagnostic tests and post analysis diagnostic tests. The panel data was analyzed using the model that was best suited for the data. The results from the analysis are then presented in figures and tables, interpreted and then discussed in accordance with both the theoretical and empirical literature.

4.2. Profile of selected commercial banks in Rwanda stock exchange

On October 7, 2005, the Rwanda Stock Exchange Limited was established with the goal of conducting stock market operations. Because it was established as a company limited by shares, the Stock Exchange was demutualized from the outset. On the 31st of January 2011, the company was formally launched. Equity Bank Group Ltd, I&M Bank Rwanda, Kenya Commercial Bank (KCB), and Bank of Kigali are the four commercial banks listed on the Rwanda stock exchange, according to the RSE report (2019).

Equity Bank Rwanda Ltd were permitted to be listed in Rwanda stock exchange in 2015; I&M Bank (Rwanda) Ltd was approved to be listed in Rwanda stock exchange in 2017, and Kenya Commercial Bank (KCB) was approved to be listed in Rwanda stock exchange in 2015(RSE, 2019).

4.2.1. Profile of Bank of Kigali

The Bank of Kigali (BK) is a commercial bank based in Kigali, Rwanda. The bank is one of the commercial banks regulated by Rwanda's banking regulator, the National Bank of Rwanda. The Bank of Kigali was founded in 1966 to serve individuals, small enterprises, and major corporations with commercial banking services. The Bank began operations in 1967, with its first branch in Kigali. Belgolaise was a subsidiary of Fortis Bank that operated in Sub-Saharan Africa until 2005, when it began to exit the continent in accordance with Fortis' strategy (2018, BK)

In 2011, the African Development Bank signed a US$12 million and $542,000 Technical Assistance Grant credit line with the second domestic company to list on the Rwanda Stock Exchange in a US$62.5 million Initial Public Offering of 45 percent of its shares. South Africa's Global Credit Grade Agency assigned it an A+/A1 credit rating. For the past three years, EMEA finance has named us the Best Bank in Rwanda, Bank of the Year by The Banker, and Company of the Year by the Kenya Institute of Management Rwanda (BK, 2018)

The Bank of Kigali's vision is to be the region's leading provider of innovative financial solutions, while its mission is to be the region's leader in creating value for our stakeholders by providing the best financial services to businesses and individual customers through motivated and professional staff (BK, 2018).

4.2.2. Profile of I&M Bank Rwanda Ltd

The bank was founded on May 25, 1963, as Rwanda's first commercial bank, as Banque Commerciale du Rwanda (BCR). Actis was renamed I&M Bank (Rwanda) Limited after an 80 percent equity buyout by a consortium consisting of I&M Bank, a Kenyan bank, and two European developmental financial institutions, DEG and Proparco, on July 17, 2012. I&M Bank Rwanda was listed on the Rwanda Stock Exchange in 2017. (I&M Bank Rwanda Ltd, 2019).

Our mission is to be growth partners for all of our stakeholders. I&M Bank will accomplish this by exceeding client expectations, motivating and developing each employee, and increasing shareholder value (I&M Bank Rwanda Ltd, 2019).

4.2.3. Profile of Equity Bank Rwanda Ltd

The National Bank of Rwanda, the country's banking regulator, has licensed Equity Bank Limited - Rwanda as one of the country's commercial banks. The bank first opened its doors in Kigali in October 2011, with branches in Rubavu, Musanze, and Muhanga. Kigali Branch, Nyarugenge, Remera, Nyabugogo, Muhanga, Musanze, Rubavu, and Rwamagana are the bank's current locations. Rwanda's Equity Bank Limited. Equity Bank Rwanda Limited was listed on the Rwanda Stock Exchange in 2015. (Equity Bank Rwanda Ltd, 2019).

Our mission is to provide inclusive, customer-focused financial services that empower our clients and other stakeholders socially and economically (Equity Bank Rwanda Ltd, 2019).

4.2.4. Profile of KCB Bank Rwanda Plc

KCB Bank Rwanda Plc is a subsidiary of KCB Bank Group, the largest commercial bank in East Africa in terms of assets. The bank was founded in Mombasa in 1896 and has a history of nearly 119 years. With 258 branches in Kenya (198), South Sudan (20), Tanzania (11), Uganda (14),

Rwanda (12), and Burundi, the KCB bank group is present in six countries (3). KCB Bank Rwanda has a network of 12 branches, 2 cash centers, 28 ATMs, and over 300 KCB Iwacu agents, spanning the length and breadth of the country to bring our products and services closer to the market.

Vision is to be the Preferred financial solutions provider in Africa with Global reach while Mission is grow our existing business whilst building the platform to be the preferred Financial Solutions Provider in Africa with Global Reach (KCB Bank Rwanda Ltd, 2019).

4.3. Descriptive statistics

A descriptive study tries to explain or describe a subject frequently by establishing an outline of a collection of problems, individuals, or events, by collecting data and the tabulation of the frequencies of research variables or their relationship. It provides a range of research objectives such as an explanation of an event or characteristics linked with a subject population, approximation of the extent of the population that possesses these features, and the unearthing of linkages among varying variables (Ngechu, 2004). In this study, the descriptive research design was selected since it enabled the generalization of the findings of the population; it will allow analysis and relation of variables. The study sought to analyze the variable under the study such as liquidity risks management; credit risk management; operating risk management and bank size on profitability of selected banks in RSE from 2015-2020 by using descriptive statistics such as mean, minimum, maximum and standard deviation.

Table 4.1:Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Credit risk management	24	1.39	7.00	03.962	1.597
Liquidity risk ratio	24	.10	.43	0.306	0.079
Operation risk ratio	24	.44	.80	0.601	0.01
Bank size	24	7.97	9.12	8.468	0.306
ROA	24	.87	4.11	2.587	0.928
ROE	24	8.63	26.07	16.83	4.819
NPM	24	10.20	38.80	25.46	8.592
Valid N (listwise)	24				

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

The credit risk management is measured by NPL to total loans of selected commercial banks in RSE, the results from the Table 4.1 show that the mean value of credit risk management of selected commercial banks in RSE for the period 2015 to 2020 was 3.96% and a standard deviation of 1.59%. This shows that most of the selected commercial banks in RSE have positive credit risk hence they were not in a position to issue more loans since there is a financial crisis with a minimum and a maximum of 1.39 % and 7.00% respectively.

The liquidity risk management is measured by liquid assets to total assets of selected commercial banks in RSE. The total mean of liquidity risk management for the period 2015 to 2020 was 0.3055(30.55%) with a standard deviation of 0.07925(7.92%) indicating variability in liquidity risk management over time. The Maximum and minimum values of liquidity risk management over the same period of time were 0.43(43%) and 0.10(10%) respectively. This Data implies that liquidity risk of the commercial banks is managed well since there is no negative minimum mean, implying that the commercial banks are following the guidelines of Central Bank of Rwanda as illustrated in the prudential guidelines.

The operational risk ratio is measured by operating expenses to net operating income ratio of selected commercial banks in RSE. The total mean of operational risk ratio for the period 2015 to 2020 was 0.6011(60.11%) and a standard deviation of 0.09973(9.97%) and this indicates that most of the selected commercial banks in Rwanda from RSE had a positive operational risk position, with a minimum and a maximum of 0.44(44%) and 0.80(80%) respectively. The positive values obtained infer that all the variables used in the study are substantial in determining the financial performance in Selected commercial banks in Rwanda from RSE.

The bank size is measured by natural logarithms of total assets of selected commercial banks in RSE. The total mean of bank size for the period 2015 to 2020 was 8.4682 with a standard deviation of 0.30611 indicating less variability in bank size over time. The minimum and maximum values of bank size over the same period of time were 7.97 and 9.12 respectively. This Data implies that bank size of the commercial banks is managed well since there is no negative minimum mean, implying that the commercial banks are following the guidelines of Central Bank of Rwanda as illustrated in the prudential guidelines.

Table 4.1 shows that the average ratio of return on assets (ROA) of selected commercial banks in RSE like BK, Equity Bank Rwanda plc, KCB Bank Rwanda Plc and I&M Bank Rwanda covered in this study for the period 2015 to 2020 was 2.5874% and a standard deviation of 0.928%, this positive result shows that the selected commercial banks in Rwanda from RSE were making a good return on assets with a minimum and a maximum of ROA of 0.87% and 4.11% respectively. This agrees with the study done by Madishetti (2013) found that internal variable like liquidity risk, credit risk, operating efficiency, quality of assets and capital adequacy determine banks profitability.

Table 4.1 shows that the average ratio of return on equity (ROE) of selected commercial banks in RSE like BK, Equity Bank Rwanda plc, KCB Bank Rwanda Plc and I&M Bank Rwanda covered in this study for the period 2015 to 2020 was 16.83% and a standard deviation of 4.81%, this positive result shows that the selected commercial banks in Rwanda from RSE were making a good return with a minimum and a maximum of ROE of 8.63% and 26.07% respectively. This implies that the principle of maximization of value of shareholders was respected in selected commercial banks in RSE over the period of 2015-2020. These finding are consistent with Hosna *et al*. (2009) which revealed that effective management of financial risk has led to an increase in return on equity in banking industries in Kenya.

Table 4.1 shows that the average ratio of net profit margin (NPM) of selected commercial banks in RSE like BK, Equity Bank Rwanda plc, KCB Bank Rwanda Plc and I&M Bank Rwanda covered in this study for the period 2015 to 2020 was 25.46% implying that the performances of commercial banks in Rwanda on average are profitable. With a standard deviation of 8.59% indicating small variability in NPM over time. The maximum and minimum values of NPM during the period of time were 38.80% and 10.20% respectively this indicating that whereas commercial banks are performing well to the maximum of 38.80%, there are some which are performing below average of 10.20%.

4.3.Inferential statistics

Inferential statistics were used in determining the direction, relationship, and strength of the association between the predictor variables and the response variable. The section entails the inferential statistics employed in the study, which included correlation and panel multiple linear regression analysis. Also, diagnostic tests that are a precursor to conducting linear regression

were conducted. The diagnostic tests included the autocorrelation test, multicollinearity test, homoscedasticity test, and normality test.

4.3.1.Correlations analysis

Correlation analysis establishes whether there exists an association between two variables. The association falls between a perfect positive and a strong negative correlation. The study used the Pearson Correlation to examine the presence of a relationship between the variables used in the study. The study envisioned to establish the relationship between each independent variable and proftability of selected commercial banks in Rwanda such as BK, Equity Bank Rwanda plc, KCB Bank Rwanda Plc, and I&M Bank Rwanda. The Pearson correlation coefficient was employed to examine the presence of a relationship between the variables used in the study. The aptness of the variables used in a study can be determined by the correlation analysis (Gosh, 2015).

Table 4.2: Correlations coefficient matrix

		X_1	X_2	X_3	X_4	ROA	ROE	NPM
Liquidity risk management(X1)	Pearson Correlation	1						
Credit risk management(X2)	Pearson Correlation	.005	1					
Operation risk management(X3)	Pearson Correlation	-.052	.101	1				
Bank size(X4)	Pearson Correlation	-.016	.416*	-.622**	1			
ROA	Pearson Correlation	.327	-.462**	-.862**	.470*	1		
ROE	Pearson Correlation	.415	-.274**	-.619**	.168*	.832**	1	
NPM	Pearson Correlation	.355	-.263**	-.850**	.364*	.953**	.872**	1

*. Correlation is significant at the 0.05 level (2-tailed).

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

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

The results show an insignificant and positive association between ROA and liquidity risk management ($r=0.327$, $p>0.05$). The results show an insignificant and positive association between ROE and liquidity risk management ($r=0.415$, $p>0.05$). This implies that liquidity risk management moves in the same direction with financial performance of commercial banks measured in terms of ROE. The results show an insignificant and positive association between NPM and liquidity risk management ($r=0.355$, $p>0.05$). This implies that liquidity risk management moves in the same direction with financial performance of commercial banks measured in terms of net profit margin. This implies that liquidity risk management moves in the same direction with financial performance of commercial banks measured in terms of ROA, ROE and NPM. The results also inconsistent with Maaka (2013) who studied on the relationship between liquidity risk and financial performance of commercial banks in Kenya and found that profitability of commercial banks in Kenya is negatively affected due to increase in liquidity gap and leverage

The results revealed that there was a negative and a significant association between Credit risk management and ROA ($r=-0.462^{**}$, $p<0.01$). The results revealed that there was a negative and a significant association between credit risk management and ROE ($r=-0.274^{**}$, $p<0.01$). The results revealed that there was a negative and a significant association between credit risk management and NPM ($r=-0.263^{**}$, $p<0.01$). This implies that credit risk management moves in opposite direction with financial performance of commercial banks measured in terms of ROA, ROE and NPM. These findings imply that credit risk management is important predictor of profitability of commercial banks. The success of bank performance depends on effectiveness of

credit risk management. These findings are in the line with Shrestha (2014) found that return on assets, return on equity, net interest margin and capital adequacy ratio have significant negative relation with non-performing loans.

The results revealed that there was a negative and a significant association between Operation risk management and ROA ($r=-0.862^{**}$, $p<0.01$). The results revealed that there was a negative and a significant association between operation risk management and ROE ($r=-0.619^{**}$, $p<0.01$). The results revealed that there was a negative and a significant association between Operation risk management and net profit margin (r=-0.850**, p<0.01). This implies that operation risk management moves in opposite direction with profitability of commercial banks measured in terms of ROA, ROE and NPM. As expected, there is a negative and significant relationship between operational risk and ROA which suggests that increase in operational risk would result to a decrease in the ROA. This suggests that unsound operational risk management practices impact negatively on banks' performance. Rwandan Commercial Banks should endeavor to comply with the various policies and guidelines issued by BNR and continuously identify emerging risks through the application of the operational risk management tools for prompt remediation of same to be able to reduce avoidable operational losses. Management of operational risk should be prioritized as it is inherent in all banking activities and has a far-reaching implication on bank's performance, reputation and going-concern. This result also corroborates findings in the researches carried out by Simamora and Oswari (2019), Ali et al. (2018), Muriithi (2016), and Ng'aari (2016). The findings provided sufficient evidences to reject the null hypothesis and established that operational risk management practices influence financial performance of Nigerian commercial banks positively. The results of the impact of financial risk types on financial performance of banks suggests that banks must also pay

attention to these risks as they can impact negatively on financial performance if they crystallize. Though banks have hitherto paid more attention to the financial risk types (i.e. credit risk and operational & liquidity risks), many still do not pay the required attention to operational risk management probably due to inadequate knowledge of its impact on bank's financials. The outcome of this study further reemphasizes the importance of operational risk management and the need for banks to pay close attention to its management as it has significant effect on their financial performance.

The results revealed that there was a positive and a significant association between bank size and ROA ($r=0.470^*$, $p<0.05$). The results revealed that there was a positive and a significant association between bank size and ROE ($r=0.168^*$, $p<0.05$). The results revealed that there was a positive and a significant association between bank size and net profit margin ($r=0.364^*$, $p<0.05$). This implies that bank size moves same direction with profitability of commercial banks measured in terms of ROA, ROE and NPM.

4.3.2. Diagostics tests

Prior to fitting the conceptualized model in the conceptual framework, panel data diagnostic tests were carried out. Diagnostic tests done in this study included normality tests, homoscedasticity tests, multicollinearity tests, and autocorrelation tests. The normality test was carried out using the Shapiro-Wilk test and the homoscedasticity test was conducted through the Breusch-Pagan test. Test on multicollinearity of data was carried out using Variance Inflation Factors (VIF) while the autocorrelation test was done through the Durbin-Watson statistic. The Hausman test was conducted to determine whether fixed or variable effects panel regression should be conducted.

4.3.2.1 Normality Test

The normality test is performed on residuals to determine whether residuals are normally distributed around the mean and constant variance. The absence of this condition implies that OLS estimators are still BLUE, but we cannot assess their statistical reliability by classical tests of significance. The normality tests for all the variables employed in the study are highlighted in Table 4.3. Shapiro wilts test was used to examine the normality of the variables. From the outcomes displayed on the table, all the variables used in the use in the study were normal. The pertinent outcomes are presented in Tables 4.3 below

Table 4.3: Shapiro-Wilk Test for Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ROA	.130	24	.200*	.957	24	.381
ROE	.086	24	.200*	.976	24	.818
Liquidity risk management(X1)	.165	24	.089	.935	24	.127
Credit risk management(X2)	.154	24	.148	.950	24	.272
Operation risk management(X3)	.126	24	.200*	.953	24	.311
Bank size(X4)	.127	24	.200*	.945	24	.214
NPM	.168	24	.077	.934	24	.117

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

Results in Table 4.3, show that Sig. value of Shapiro-Wilk of ROA is equal to 0.381 which is great than 0.05 implies that ROA data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significance

Table 4.3 reports results which shows that Sig. value of Shapiro-Wilk of ROE is equal to 0.818 which is great than 0.05 implies that ROE data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significance

Table 4.3 indicates that Sig. value of Shapiro-Wilk of liquidity risk management is equal to 0.127 which is great than 0.05 implies that liquidity risk management data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significance.

Table 4.3 reveals that Sig. value of Shapiro-Wilk of credit risk management is equal to 0.272 which is great than 0.05 implies that credit risk management data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significance.

Table 4.3 shows that Sig. value of Shapiro-Wilk of operation risk management is equal to 0.311 which is great than 0.05 implies that operation risk data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significant.

Table 4.3 also show that Sig. value of Shapiro-Wilk of bank size is equal to 0.214 which is great than 0.05 implies that bank size data is normal because Sig. value of Shapiro-Wilk is great than 0.05 level of significant.

Finally, Table 4.3 shows that Sig. value of Shapiro-Wilk of NPM is equal to 0.117 which is great than 0.05 implies that NPM is normal because Sig. value of 0.117 is great than 0.05 level of significant. The study concluded that since all variable both independent and dependent are normally distributed and allow the researcher to regress the model by using linear regression analysis.

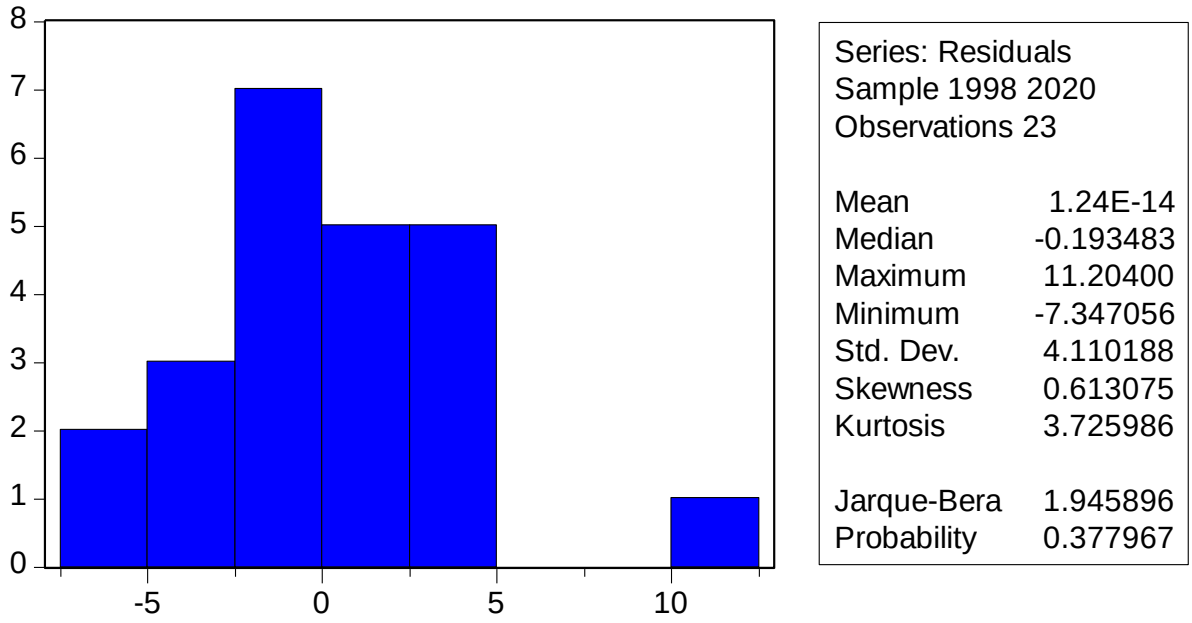


Figure 4.1: Normality test

Source: Financial reports of selected commercial banks in Rwanda, 2015-2020

The normality test from Figure above showed that residuals are normally distributed (the probability of JARQUE-BERA is equal to 0.377967, and is greater than critical probability 5%). The confirmation of residual normality as shown by Figure 4.1 above implies that the estimated linear regression model has realistic predictive powers, and valid predictions can be drawn from its results.

4.3.2.2 Test for Multicollinearity

Multicollinearity is said to exist when two or more variables which are predictors are correlated. According to Gujarati (2012), a multicollinearity problem affects the coefficients of the regression model such that estimation cannot be carried out with accuracy and meticulousness due to standard errors. Variance inflation factor was adopted by the study to test the multicollinearity. According to Gujarati & Greene (2012), a VIF value of 1 shows not

multicollinearity problem, values between 1 and 5, is an indicator of reasonable multicollinearity problem in predictor variables while a value greater than 5 shows highly correlated variables in the study. Zikmund et al. (2013) mentioned when there are two or more variables have a Variance Inflation Factor (VIF) of 5 and above, amongst them one should be removed from the regression analysis as this shows multicollinearity. Thus, in a study, if two or more variables have a Variance Inflation Factor of 5 or more than that one of them must be removed out if the same.

Table 4.4: VIF Multicollinearity Statistics

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	Liquidity risk management	.990	1.010
	Credit risk management	.612	1.635
	Operation risk management	.453	2.210
	Bank size	.378	2.643

a. Dependent Variable: ROA
Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

Table 4.4 indicated that all the independent variables were not highly correlated with each other as indicated by the Variance Inflation Factors (VIF) of below five. Since all four variables has VIF which is less than 5 indicating that there is no multicollinearity. Therefore, all variable of predictors must be included in the model.

4.3.2.3. Serial correlation

The problem of autocorrelation, also referred to as serial correlation arises when the error terms are correlated. The use of parametric tests requires that the error terms are not correlated. To check for autocorrelation, the correlogram-Q-residuals test and Breusch-Godfrey Serial Correlation LM Test was calculated.

Table 4.5: Results from autocorrelation analysis using Correlogram-Q-residuals test

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |* . |	. |* . |	1	0.158	0.158	0.6487	0.421
. *| . |	. *| . |	2	-0.064	-0.091	0.7600	0.684
. | . |	. | . |	3	0.004	0.030	0.7603	0.859
. *| . |	. *| . |	4	-0.162	-0.180	1.5572	0.816
. | . |	. |* . |	5	0.002	0.069	1.5574	0.906
. |* . |	. | . |	6	0.075	0.034	1.7467	0.941
. | . |	. | . |	7	0.039	0.037	1.8006	0.970
. |* . |	. | . |	8	0.069	0.038	1.9841	0.981
. |* . |	. |* . |	9	0.141	0.144	2.7993	0.972
. *| . |	.**| . |	10	-0.181	-0.226	4.2438	0.936
.**| . |	. *| . |	11	-0.196	-0.104	6.0882	0.867
. *| . |	. *| . |	12	-0.123	-0.121	6.8831	0.865

Source: Author's Estimation in EViews4 using data from NISR, 2003-2020

As shown in Table 4.5, results from autocorrelation analysis using the Correlogram-Q-residuals test illustrate that there is no autocorrelation in the model because up to the 12th lag the probability is greater than the critical value of 5%

Table 4.6: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.313259	Probability	0.735444
Obs*R-squared	0.866683	Probability	0.648339

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

Serial correlation analysis using the Breusch-Godfrey Serial Correlation LM Test also showed that there is no serial correlation between variables in the model (R-Squared is 0.648339 and is greater than the critical p-value). This leads to the decision of accepting the null hypothesis of no serial correlation.

4.3.2.4. Heteroscedasticity test

As discussed earlier, the OLS regression method assumes that the random error terms in the regression model display constant and equal variance. Therefore, to test for the presence of heteroscedasticity in the regression model a Breusch-Pagan/Cook-Weisberg Heteroscedasticity test was conducted. Breusch Pagan Langrage Multiplier test was used to examine the random effects. The test hypothesed that there zero variance across the entities against the alternative that there was variance variation across the entities. When the dependent variable was ROA there was evidence to warrant rejection of the null hypothesis and hence we concluded that their random effects were not appropriate to fit and the most appropriate model was random effects.

Table 4.7:White Heteroskedasticity Test:

F-statistic	0.183643	Probability	0.989320
Obs*R-squared	2.184366	Probability	0.974831

Results from table 4.7, heteroscedasticity tests using the ARCH approach, as shown in Table 4.7, reveal that there is no heteroscedasticity (significant value of Obs*R-squared of **0.974831**is greater than critical p-value 5%)

4.3.3. Multiple linear regression analysis

The regression model was expressed as follows: dependent variable (return on equity, return on assets and net profit margin); B0 is the y intercept (Constant); β_1- β_4 are coefficients of determination of liquidity risk management, credit risk management, operation risk management and bank size. In order to ascertain the effect of the independent such as liquidity risk management, credit risk management, operation risk management and bank size on dependent variables of the study, multiple regression analysis was used. This was performed using the field data and tested at 5% level of significance. The regression model gives the magnitude of the cause-effect relationship as well as the direction of the relationship. This is achieved through the estimation of the coefficients of estimations attributed to the explanatory variables.

4.3.3.1. Effect of financial risks management on return on assets as indicators of financial performance of commercial banks in Rwanda

The study sought to assess the effect of financial risks such as liquidity risk management, credit risk management, operation risk management and bank size on return on assets as indicators of financial performance of commercial banks in Rwanda by using regression analysis

Table 4.8: Effect of financial risks management on return on assets as indicators of financial performance of commercial banks in Rwanda

Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Liquidity risk management	0.076474	0.085889	0.890384	0.3850
Credit risk management	-1.352811	0.459111	-2.94659	0.0013
Operation risk management	-9.329921	1.601561	-5.825519	0.0000
Bank size	0.637192	0.267218	2.38454	0.0360
C	13.43444	5.395460	2.489953	0.0228
R-squared	0.753131	Mean dependent var		2.624217
Adjusted R-squared	0.698271	S.D. dependent var		0.931189
S.E. of regression	0.511501	Akaike info criterion		1.686724
Sum squared resid	4.709392	Schwarz criterion		1.933571
Log likelihood	-14.39733	F-statistic		13.72829
Durbin-Watson stat	1.655942	Prob(F-statistic)		0.000026

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

$Y = \beta 0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_{3+}\beta_4 x_{4+}e$

Based on the findings above the model one (1) is represented as follows:

Profitability items of ROA = 13.434+0.076 liquidity risk management -1.35credit risk management -9.32 operation risk management +0.63 bank size

The regression equation in Table 4.8 has established that taking all factors into account (liquidity risk management, credit risk management, operation risk management and bank size) constant at zero, profitability items of ROA of selected commercial banks in RSE will be 13.434.

The regression results revealed that liquidity risk management has insignificance positive effect on profitability items of ROA of selected commercial banks in RSE as indicated by β_1= 0.0764, p-value=0.3850>0.05, t=0.890. This implies that taking all other independent variables at zero, a unit increase in liquidity risk management would lead to 0.0764 increases of profitability items of ROA of selected commercial banks in RSE. This means that a one percent increase in liquidity risk management, leads to an increase in ROA by 0.0764%.

The regression results revealed that credit risk management has significance negative effect on profitability items of ROA of selected commercial banks in RSE as indicated by β_2= -1.352, p-value=0.0013<0.05, t= -2.946. This implies that taking all other independent variables at zero, a unit increase in credit risk management would lead to a decline of 1.352 in profitability items of ROA of selected commercial banks in RSE. This means that a one percent increase in credit risk management, leads to a decline in ROA by 1.352%.

The regression results revealed that operation risk management has significance negative effect on profitability items of ROA of selected commercial banks in RSE as indicated by β_3= -9.329, p-value=0.0000<0.05, t= -5.825. This implies that taking all other independent variables at zero, a unit increase in operation risk management would lead to a decline of 9.329 in profitability items of ROA of selected commercial banks in RSE. This means that a one percent increase in operation risk ratio, leads to a decline in ROA by 9.329%.

The regression results revealed that bank size has significance positive effect on profitability items of ROA of selected commercial banks in RSE as indicated by β4= 0.637, p-value=0.0360<0.05, t=2.489953. This implies that taking all other independent variables at zero, a unit increase in bank size would lead to 0.637 increases of profitability items of ROA of

selected commercial banks in RSE. This means that a one percent increase in bank size, leads to an increase in ROA by 0.637%.

The results from Table 4.8. show that the value of coefficient of determination (Adjusted R Square) was 0.698 (69.8%) an indication that there was variation of 69.8% in profitability items of ROA of selected commercial banks in RSE was due to changes in liquidity risk management, credit risk management, operation risk management and bank size. Since the variables in the model count 69.8% change in profitability items of ROA of selected commercial banks in RSE. The contribution of all factors either in the model or not in the model count 100%. Therefore, there are other factors that profitability items of ROA of selected commercial banks in RSE that are not included in the model which account for 30.2% towards profitability items of ROA of selected commercial banks in RSE

The data in Table 4.8 show that value of F calculated is 13.728. The overall model was significant because calculated F statistic of 13.728 was large than the critical F (V1=3, V2=20) =3.10 and also because p-value calculated =0.000026 is less than Critical p-value =0.05 level of significant. Since the value of F calculated is greater than F critical, the overall regression model was significant and therefore a reliable indicator of the study findings. In terms of p values, the study indicated 0.000026 which is less than 0.05 and therefore statistically significant.

4.3.3.2. Effect of financial risks management on ROE as indicators of financial performance of commercial banks

The study sought to assess the effect of financial risks such as liquidity risk management, credit risk management, operation risk management and bank size on return on equity (ROE) as indicators of financial performance of commercial banks in Rwanda by using regression analysis.

Table 4.9: Effect of financial risks management on ROE as indicators of financial performance of commercial banks

Dependent Variable: ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Liquidity risk management	0.157523	0.664282	0.237	0.8152
Credit risk management	-1.899700	0.46289	-4.104	0.010
Operation risk management	-37.94071	12.38677	-3.063	0.0067
Bank size	4.805200	.886975	5.4175	0.000
C	81.63228	41.72951	1.956	0.0661
R-squared	0.440074	Mean dependent var		17.06783
Adjusted R-squared	0.315645	S.D. dependent var		4.782119
S.E. of regression	3.956043	Akaike info criterion		5.778026
Sum squared resid	281.7049	Schwarz criterion		6.024872
Log likelihood	-61.44730	F-statistic		3.536770
Durbin-Watson stat	1.178630	Prob(F-statistic)		0.026836

Source: **Financial reports of selected commercial banks in Rwanda, 2015-2020**

$Y = \beta 0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_{3+}\beta_4 x_{4+}e$

Based on the findings above the model two (2) is represented as follows:

Profitability items of ROE = 81.63 +0.157 liquidity risk -1.899credit risk -37.94 operation risk + 4.805 bank size

The regression equation in Table 4.9 has established that taking all factors into account (liquidity risk, credit risk, and operation risk and bank size) constant at zero, profitability items of ROE of selected commercial banks in RSE will be 81.63

The regression results revealed that liquidity risk management has insignificance positive effect on profitability items of ROE of selected commercial banks in RSE as indicated by β_1= 0.157, p-value=0.8152>0.05, t=0.237. This implies that taking all other independent variables at zero, a unit increase in liquidity risk management would lead to 0.157 increases of profitability items of ROE of selected commercial banks in RSE. This means that a one percent increase in liquidity ratio, leads to an increase in ROE by 0.157%.

The regression results revealed that credit risk management has significance negative effect on profitability items of ROE of selected commercial banks in RSE as indicated by β2= -1.899, p-value=0.010<0.05, t= -4.104. This implies that taking all other independent variables at zero, a unit increase in credit risk management would lead to a decline of 1.899 in profitability items of ROE of selected commercial banks in RSE. This means that a one percent increase in credit risk management, leads to a decline in ROE by 1.899%. The study findings are not congruent to the current study findings Li and Zou (2014) executed a survey on the influence of credit risk management on the profitability of a commercial bank in Europe. The findings revealed that there is a negative association between CRM and commercial banks' profitability. Between the two credit risk management proxies, and NPLs ratio has a strong impact on both ROA and ROE while Capital Adequacy Ratio has a negligible impact on both ROA and ROE.

The regression results revealed that operation risk management has significance negative effect on profitability items of ROE of selected commercial banks in RSE as indicated by β3= -37.940, p-value=0.0067<0.05, t= -3.063. This implies that taking all other independent variables at zero, a unit increase in operation risk management would lead to a decline of 37.940 in profitability items of ROE of selected commercial banks in RSE. This means that a one percent increase in operation risk ratio, leads to a decline in ROE by 37.94%.

The regression results revealed that bank size has significance positive effect on profitability items of ROE of selected commercial banks in RSE as indicated by β4=4.805, p-value=0.000>0.05, t=5.41. This implies that taking all other independent variables at zero, a unit increase in bank size would lead to 4.805 increases of profitability items of ROE of selected commercial banks in RSE. This means that a one percent increase in bank size, leads to an increase in ROE by 4.805%.

The results in Table 4.9. show that the value of coefficient of determination (Adjusted R Square) was 0.31564 (31.56%), an indication that there was variation of 31.56% in profitability items of ROE of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. Since the variables in the model count 31.56% change in profitability items of ROE of selected commercial banks in RSE. The contribution of all factors either in the model or not in the model count 100%. Therefore, there are other factors that profitability items of ROE of selected commercial banks in RSE that are not included in the model which account for 68.44% towards profitability items of ROE of selected commercial banks in RSE

The data in Table 4.9 also show that the value of F calculated is 3.536770. The overall model was significant because calculated F statistic of 3.536770 was large than the critical F (V1=3, V2=20) =3.10 and also because p-value calculated =0.026836 is less than Critical p-value =0.05 level of significant. Since the value of F calculated is greater than F critical, the overall regression model was significant and therefore a reliable indicator of the study findings. In terms of p values, the study indicated 0.026836 which is less than 0.05 and therefore statistically significant.

4.3.3.3. Effect of financial risks management on NPM of as indicators of financial performance of commercial banks

The study sought to assess the effect of financial risks such as liquidity risk management, credit risk management, operation risk management and bank size on net profit margin (NPM) as indicators of financial performance of commercial banks in Rwanda by using regression analysis

Table 4.10: Effect of financial risks on NPM of as indicators of financial performance of commercial banks

Dependent Variable: NPM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Liquidity risk management	0.459195	0.763007	0.601822	0.5548
Credit risk management	-11.15274	2.01787	-5.52699	0.0000
Operation risk management	-82.02250	14.22768	-5.764996	0.0000
Bank size	5.365999	0.738960	7.261555	0.0000
C	118.6434	47.93129	2.475282	0.0235
R-squared	0.771743	Mean dependent var		25.81739
Adjusted R-squared	0.721019	S.D. dependent var		8.602994
S.E. of regression	4.543984	Akaike info criterion		6.055145
Sum squared resid	371.6602	Schwarz criterion		6.301992
Log likelihood	-64.63417	F-statistic		15.21462
Durbin-Watson stat	1.605268	Prob(F-statistic)		0.000013

Source: Financial reports of selected commercial banks in Rwanda, 2015-2020

Based on the findings above the model three (3) is represented as follows:

Profitability items of NPM = 118.64+0.459 liquidity risk -11.15 credit risk -82.02 operation risk +5.365 bank size

The regression equation in Table 4.10 has established that taking all factors into account (liquidity risk, credit risk, and operation risk and bank size) constant at zero, profitability items of NPM of selected commercial banks in RSE will be 118.64

The regression results revealed that liquidity risk management has insignificance positive effect on profitability items of NPM of selected commercial banks in RSE as indicated by β_1= 0.4591, p-value=0.5548>0.05, t=0.601. This implies that taking all other independent variables at zero, a unit increase in liquidity risk management would lead to 0.459 increases of profitability items of NPM of selected commercial banks in RSE. This means that a one percent increase in liquidity ratio, leads to an increase in NPM by 0.459%.

The regression results revealed that credit risk management has significance negative effect on profitability items of NPM of selected commercial banks in RSE as indicated by β2= -11.15, p-value=0.0000<0.05, t= -5.526. This implies that taking all other independent variables at zero, a unit increase in credit risk management would lead to a decline of 11.15 in profitability items of NPM of selected commercial banks in RSE. This means that a one percent increase in credit risk management, leads to a decline in NPM by 11.15%.

The regression results revealed that operation risk management has significance negative effect on profitability items of NPM of selected commercial banks in RSE as indicated by β_3= -82.022, p-value=0.0000<0.05, t= -5.7649. This implies that taking all other independent variables at zero, a unit increase in operation risk management would lead to a decline of 82.02 in profitability items of NPM of selected commercial banks in RSE. This means that a one percent increase in operation risk ratio, leads to a decline in NPM by 82.022%.

The regression results revealed that bank size has significance positive effect on profitability items of NPM of selected commercial banks in RSE as indicated by β_4=5.365, p-value=0.000>0.05, t=7.261. This implies that taking all other independent variables at zero, a unit increase in bank size would lead to 5.365 increases of profitability items of NPM of selected commercial banks in RSE. This means that a one percent increase in bank size, leads to an increase in NPM by 5.365%.

The results from the above Table 4.10 show that the value of coefficient of determination (Adjusted R Square) was 0.72101(72.10%), an indication that there was variation of 72.1% in profitability items of NPM of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. Since the variables in the model count 72.1%

change in profitability items of NPM of selected commercial banks in RSE. The contribution of all factors either in the model or not in the model count 100%. Therefore, there are other factors that profitability items of NPM of selected commercial banks in RSE that are not included in the model which account for 27.9% towards profitability items of NPM of selected commercial banks in RSE

The data in Table 4.10 also show the value of F calculated as 15.214. The overall model was significant because calculated F statistic of 15.214 was large than the critical F (V1=3, V2=20) =3.10 and also because p-value calculated =0.000013 is less than Critical p-value =0.05 level of significant. Since the value of F calculated is greater than F critical, the overall regression model was significant and therefore a reliable indicator of the study findings. In terms of p values, the study indicated 0.000013 which is less than 0.05 and therefore statistically significant.

4.3.4. Hypothesis testing

The hypothesis was performed using multiple linear regressions. The rejection and acceptance criteria were when p value is less than 0.05, Ho is rejected while if p-value is great than 0.05, then H0 will be accepted

4.3.4.1. Testing hypothesis one

Hypothesis one states that there is no significant effect of liquidity risks management on profitability items of ROA, ROE and NPM of selected banks in RSE. Ho1: β1=0. Reject the null hypothesis if p-value (Sig. value) is less than 0.05. Results in Table 4.8, regression coefficients of liquidity risk management (β1) = 0.0764 and p-value =0.3850 which is greater than 5% of level of significant; Results in Table 4.9, regression coefficients of liquidity risk management (β1) = 0.157 and p-value =0.8152 which is greater than 5% of level of significant and Results in Table4.10, regression coefficients of liquidity risk management (β1) = 0.4591 and p-value =

0.5548 which is greater than 5% of level of significant. The null hypothesis was accepted because regression results revealed that p-value calculate is greater than 0.05 (5%) level of significance. Hence, the study concluded that there is no significant positive effect of liquidity risks management on profitability items of ROA, ROE and NPM of selected banks in RSE.

4.3.4.2. Testing hypothesis two

The second hypothesis of the study stated that there is no significant effect of credit risk management on profitability items of ROA, ROE and NPM of selected banks in RSE. Ho2: $\beta 2=0$. Reject the null hypothesis if p-value (Sig. value) is less than 0.05. Results in Table4.8, regression coefficients of credit risk management ($\beta 2$) = -1.352 and p-value =0.0013 which is less than 5% of level of significant; Results in Table4.9, regression coefficients of credit risk management ($\beta 2$) = -1.899 and p-value =0.010 which is less than 5% of level of significant and Results in Table4.10, regression coefficients of credit risk management ($\beta 2$) = -11.15 and p-value =0.0000 which is less than 5% of level of significant. The null hypothesis was rejected because regression results revealed that p-value calculate is less than 0.05 (5%) level of significance. Hence, the study concluded that there is significant negative effect of credit risk management on profitability items of ROA, ROE and NPM of selected banks in RSE.

4.3.4.3. Testing hypothesis three

The third hypotheses of the study stated that there is no significant effect of operational risk management on profitability items of ROA, ROE and NPM of selected banks in RSE. Ho3: $\beta 3=0$. Reject the null hypothesis if p-value (Sig. value) is less than 0.05. Results in Table4.8, regression coefficients of operating risk management ($\beta 3$) = -9.329 and p-value = 0.0000 which is less than 5% of level of significant; Results in Table4.9, regression coefficients of operating risk management ($\beta 3$) = -37.940 and p-value = 0.006 which is less than 5% of level of significant and Results in Table4.10, regression coefficients of operating risk management ($\beta 3$) = -82.022

and p-value =0.0000 which is less than 5% of level of significant. The null hypothesis was rejected because regression results revealed that p-value calculate is less than 0.05(5%) level of significance. Hence, the study concluded that there is significant negative effect of operational risk management on profitability items of ROA, ROE and NPM of selected banks in RSE

4.3.4.4. Testing hypothesis four

The fourth hypotheses of the study stated that there is no significant effect of bank size on profitability items of ROA, ROE and NPM of selected banks in RSE. Ho4: β4=0. Reject the null hypothesis if p-value (Sig. value) is less than 0.05.; Results in Table4.8, regression coefficients of bank size (β4) = 0.637 and p-value =0.0360 which is less than 5% of level of significant; Results in Table4.9, regression coefficients of bank size (β4) = 4.805 and p-value =0.0000 which is less than 5% of level of significant and Results in Table4.10, regression coefficients of bank size (β4) = 5.365 and p-value =0.000 which is less than 5% of level of significant. The null hypothesis was rejected because regression results revealed that p-value calculate is less than 0.05(5%) level of significance. Hence, the study concluded that there is significant positive effect of bank size on profitability items of ROA, ROE and NPM of selected banks in RSE.

CHAPTER FIVE
MAJOR FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0. Introduction

This section presents the summary of the study's findings, offered conclusions, and recommendations on the effect of financial risk on the profitability of selected commercial banks in RSE. Additionally, further research suggestions are also outlined. The main objective of the study was to examine the effect of credit risk management, liquidity risk management and operational risk management on profitability of selected commercial banks in Rwanda from RSE. The period of the study was 6 years, from 2015 to 2020.

5.1. Summary of findings

This section presented the summary of findings based on the results objective such as to establish the effect of financial risk management on profitability of selected commercial banks in RSE. The study specifically aimed to assess the effect of liquidity risks management on profitability of selected banks in RSE, to examine the effect of credit risk management on profitability of selected banks in RSE; to find out the effect of operating risk management on profitability of selected banks in RSE and to determine the effect of bank size on profitability of selected banks in RSE

5.1.1. Effect of liquidity risks management on profitability of selected banks in RSE

The study sought to assess the effect of liquidity risks management on profitability of selected banks in RSE. From the results obtained, the ratio of liquidity risk was determined by dividing total liquid assets with total assets which were not significant for this study since the p-value obtained was insignificant to show any effect on profitability of selected commercial banks in RSE. This means that most selected commercial banks in Rwanda from RSE were able to maintain the minimum prescribed level of liquidity as expected hence there was no correlation

between liquidity risk management and profitability. The ratio of liquidity risk from the examined selected commercial banks in Rwanda from RSE was found to be irrelevant and not correlated to the reported high level of profitability this can be attributed to the reason that for selected commercial banks in RSE to lend will depend on the liquidity position in existence provided members' deposits are available when the need for a loan arises and prescribed level of liquidity is maintained at all time. This indicated commercial banks were having the ability to meet the demand for new loans and cater to unexpected savings withdrawals at the lowest cost and also had the capacity to meet its debts as they fall due hence no influence on profitability of selected commercial banks in Rwanda.

5.1.2. Effect of credit risk management on profitability of selected banks in RSE

The study aimed to examine the effect of credit risk management on profitability of selected banks in RSE. The results obtained from the study indicated that there is negative significant effect of credit risk management on profitability measured by ROA, ROE and NPM of selected commercial banks in RSE. The high level of credit risk management greatly negatively affected the level of profitability as reported by selected commercial banks in RSE. This could be attributed to the fact that if a financial institution invests in high risky ventures or lend money to an individual considered as high-risk borrower chances of making huge losses are inevitable since borrowers may end not paying at all or delay unreasonably to honor their obligations of repaying their loans. In most cases, a high rate of delinquent loans may have a negative implication on the liquidity position of commercial banks to care and a thorough review of borrowers should be done to prevent those loans from becoming bad debt which may cripple the liquidity position of the lender at a given time. These results are in agreement with other studies arguing that credit risk influences financial performance reported by selected commercial banks in RSE.

5.1.3. Effect of operating risk management on profitability of selected banks in RSE

The objective of the study was to find out the effect of operating risk management on profitability of selected banks in RSE. The results found obliged the study to reject the null hypothesis that operational risk management affect the level of profitability reported by selected commercial banks in Rwanda. The results obtained from the study indicated that there is negative significant effect of operating risk management on profitability measured by ROA, ROE and NPM of selected commercial banks in RSE. Therefore, the high level of operational risk ratio attracted a low level of profitability of selected commercial banks in RSE. This could be attributed to the fact that if a financial institution has a high level of expenses that are directly related to the operation and investment of selected commercial banks in RSE low rates of returns are attained. If a selected commercial banks in RSE hires competent and qualified personnel and embraces the latest technology in its operations, it may be expensive but low rates of returns are guaranteed in most cases.

5.1.4. Effect of bank size on profitability of selected banks in RSE

The objective of the study was to determine the effect of bank size on profitability of selected banks in RSE. The results found obliged the study to reject the null hypothesis that bank size affect positively the level of profitability reported by selected commercial banks in Rwanda. The results obtained from the study indicated that there is positive significant effect of bank size on profitability measured by ROA, ROE and NPM of selected commercial banks in RSE. The high level of bank size attracted a high level of profitability as reported by selected commercial banks in Rwanda from RSE. This could be attributed to the fact that if a financial institution has a high level of assets that are directly related to the investment of banks high rates of returns are attained. If a selected commercial banks increase its both financial assets generate amount of return in the future.

5.2. Conclusions

The study sought to determine the effects of financial risks management on profitability of selected commercial banks in RSE. The study concluded that the value of coefficient of determination (Adjusted R Square) was 0.698 (69.8%) an indication that there was variation of 69.8% in profitability items of ROA of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. The study concluded that the value of coefficient of determination (Adjusted R Square) was 0.31564 (31.56%) an indication that there was variation of 31.56% in profitability items of ROE of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. The study concluded that the value of coefficient of determination (Adjusted R Square) was 0.72101(72.10%) an indication that there was variation of 72.1% in profitability items of NPM of selected commercial banks in RSE was due to changes in liquidity risk, credit risk, operation risk and bank size. Since the variables in the model count 72.1% change in profitability items of NPM of selected commercial banks in RSE.

The study concluded that liquidity risk management has a positive insignificant effect on profitability of selected commercial banks in RSE which indicates that an increase of liquidity risk by one unit leads to an increase in financial performance when credit risk management, operational risk management and size of bank are held constant. This implies that decrease or increase of this variable does not have any effect level on profitability of selected commercial banks in RSE. The study concluded that credit risk reported a significant negative effect on profitability of selected commercial banks in Rwanda from RSE, this implies that increase of this variable have negative effect level on the profitability of selected commercial banks in RSE. The study concluded that the operational risk presented a significant negative effect with the

profitability of selected commercial banks in RSE which implied that an increase of operational risk management leads to a decrease in the profitability of selected commercial banks in RSE. The study concluded that the bank size presented a significant positive significant effect with the profitability of selected commercial banks in RSE which implied that an increase of bank size leads to an increase in the profitability of selected commercial banks in RSE.

5.3. Recommendations

Based on the findings, the following recommendation are addressed to the management of commercial banks, central banks and the management of Rwanda stock Exchange.

5.3.1. To the management of selected commercial banks

This issue of financial risks must be addressed in order to ensure that chosen commercial banks in the RSE have their investments safeguarded and obtain worthy dividends for their members, and as a result, for a country to achieve acceptable economic growth.

Management should also be responsible for ensuring that the lending terms and conditions are adhered to during the loan approval process. Credit management should approve and document lending policies, and all workers should be aware of them. This outcome will lower non-performing loan losses and improve asset quality management, resulting in higher RSE expenses for selected commercial banks and hence improved financial performance. It is also recommended that the RSE-selected commercial banks in Rwanda examine the loan and advances to total deposits ratio on a monthly basis, as this can have a detrimental impact on commercial banks' profitability.

Commercial banks' primary function is to create credit, which, as seen below, exposes the company to risk due to borrowers' failure to pay their obligations. As a result, banks should

exercise caution while managing credit risk, as it may cause banks to transition from an economic to a systemic crisis. Since a high level of risk management yields significant returns, the risk management process should be ongoing and evolving over time, according to the study. The importance of balancing risk and reward cannot be overstated.

The report also suggests that commercial bank management should be aware of their liquidity status in different product segments. This will help them diversify their financial portfolio while also giving them a competitive advantage in the marketplace. The attention that a bank's management pays to liquidity issues is of the utmost importance. These issues should be addressed as soon as possible, and quick corrective action should be done to avoid the bank becoming illiquid.

Based on the findings, it is suggested that management of chosen commercial banks in RSE improve their credit analysis and loan administration capabilities. It is necessary to develop clear credit standards and lending guidelines. Management is also responsible for ensuring that the terms and conditions of loan approval are followed. As a result, senior management should approve lending standards and make them known to all employees. This will lower nonperforming loan losses and improve asset quality management, raising bank expenses and, as a result, increasing profitability. It is also suggested that the bank examine the loan and advances to total deposits ratio on a regular basis, as this has an impact on profitability.

Operational risk has been shown to have a major impact on financial performance; as a result of this discovery, it is recommended that selected commercial banks in RSE develop a permanent risk mitigation strategy and make all employees aware of the risks they face. The internal audit group of Selected Commercial Banks in Rwanda is responsible for conducting consistent

evaluations of operational risk management. The board of directors and top portfolio managers of Selected Commercial Banks in Rwanda are expected to participate in risk management. As a result, any operational risk reduction guidelines and methods set by the BNR are important and management should be wholly followed to ensure all risks are well alleviated and this will lead to an increase in financial performance of Selected commercial banks in Rwanda

In terms of liquidity, the study suggests that banks continue to lend to potential consumers in order to boost their profitability through interest rates. To decrease liquidity risk, banks should also increase liquid holdings. Furthermore, the study suggests that banks devise techniques to meet their short-term obligations by increasing loan disbursement to their consumers.

The report also suggests that banks establish measures to control risks associated with the transaction, such as collateral and clients' ability to repay the borrowed amount. The report also suggests that banks provide advice to their customers on how to invest the money they have borrowed.

5.3.2. Recommendation to Central banks

Central banks should aim to provide liquidity in whatever ways they can, without taking on excessive financial risk. The better the central bank’s risk management, the better the liquidity services the central bank can provide for a given risk budget; or, the other way round, the less risk it will have to take on for a given set of liquidity services.

A central bank can provide liquidity to the banking system as a whole through its regular open market operations. These can be extended in terms of the maturity of the lending operations and relaxed in terms of their tender procedures, depending on the nature, depth and expected duration

of a liquidity crisis. Furthermore, financial institutions have access to standing lending facilities, which are normally provided to banks at a penalty rate.

Collateral policies should at the very least obey the principle of central bank inertia in a crisis – i.e. they should not be tightened. They can even be loosened, provided that an appropriate risk management framework guards against both financial risk for the central bank and moral hazard. Again, the precise measures implemented by a central bank will depend on the nature, depth and expected duration of a liquidity crisis.

Extraordinary liquidity measures can be complemented by non-standard monetary policy measures, such as the outright purchase of securities. One example of such a measure is the covered bond portfolio programme announced today. Such purchases have a longer-lasting impact on the balance sheet of the central bank, making it all the more important that a carefully designed risk control framework be put in place.

Furthermore, the central bank can provide emergency liquidity assistance to individual banks in so far as these are illiquid but not insolvent. This must be done in close cooperation with supervisory authorities, in order to ensure that informed decisions are made and public resources are used wisely. Admittedly, the chain reactions that can be triggered by liquidity problems mean that it is sometimes difficult to determine whether a financial institution that requires liquidity assistance remains inherently solvent.

5.3.3. Recommendation to RSE

The board of management of selected commercial banks in RSE should increase their capacity in credit analysis and loan review procedures, based on the findings. Create perfect credit regulations and lending guidelines that must be followed.

RSE should expound their risk measurements techniques so as to adequately manage the financial risks resulting from the increased financial innovations in the banking sector. Also the banking institution should explore the use of derivatives to mitigate the financial asset risks. RSE should also check their risk management policy and practices and streamline them with global standards such as the Basel III accords

Liquidity risk Prudent liquidity risk management implies maintaining sufficient cash and cash equivalents to meet obligations as they fall due. RSE ensures its inflows and outflows are matched sufficiently to minimize its exposure on liquidity risk.

5.4. Suggestion for further researcher

Since the variables in the model count 72.1% change in profitability items of NPM of selected commercial banks in RSE. The contribution of all factors either in the model or not in the model count 100%. Therefore, there are other factors that profitability items of NPM of selected commercial banks in RSE that are not included in the model which account for 27.9% towards profitability items of NPM of selected commercial banks in RSE. Hence, the researcher suggests the following areas for further research as they are closely related to the outcome of the current study:

1. Effect of marketing risk on profitability of commercial banks in Rwanda

2. Impact of economic crisis on profitability of commercial banks in Rwanda

3. Effect of covid-19 crisis on profitability of commercial banks in Rwanda

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APPENDICES

Appendix I: Element of financial report extracted from financial statement of commercial banks in Rwanda

I&M Bank	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Sales revenue	15,830,877	20,441,506	24,483,000	30,960,821	34,808,787	39,123,691
Net interest income	11,339,746	17,564,572	14,605,326	20,226,290	21,865,985	22,412,747
Net operating income	18,390,451	20,841,996	23,037,880	25,746,004	27,395,198	25,655,034
Net operating expenses	11,266,365	12,426,791	13,189,549	14,928,582	18,404,824	17,816,686
Net income	4,702,171	7,932,449	6,513,401	7,446,211	6,204,384	5,215,780
TOTAL ASSETS	171,826,768	206,138,860	260,174,192	294,165,633	317,899,026	417,203,688
Total Equity	24,460,676	30,423,125	35,064,526	39,567,498	42,786,882	54,476,853
Total loans of customers	94,028,874	111,083,056	146,513,373	169,032,838	171,887,690	205,229,128
Non-performing loans	1,302,859	2,999,243	3,648,183	5,278,387	5,881,051	7,203,542
Liquid assets	36,101,264	67,728,273	74,422,257	29,672,404	47,136,879	119,644,436
NPL *Ratio*	**1.39**	**2.70**	**2.49**	**3.12**	**3.42**	**3.51**
Liquidity risk	**0.21**	**0.329**	**0.286**	**0.101**	**0.148**	**0.287**
Operation risk	**0.613**	**0.596**	**0.573**	**0.58**	**0.672**	**0.694**
ROA	**2.737**	**3.848**	**2.503**	**2.531**	**1.952**	**1.25**
ROE	**19.223**	**26.074**	**18.575**	**18.819**	**14.501**	**9.574**
NPM	**29.703**	**38.806**	**26.604**	**24.05**	**17.824**	**13.332**
BK	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Sales revenue	59,966,855	72,254,385	82,223,868	93,997,805	116,517,161	145,491,017
Net interest income	46,239,769	55,698,149	63,907,888	75,798,699	94,773,445	112,793,315
Net operating income	56,170,282	59,823,515	74,609,432	90,116,654	103,084,562	102,468,483
Net operating expenses	30,433,050	29,842,400	40,437,398	47,515,029	50,216,677	45,173,553
Net income	20,484,058	26,214,447	23,348,880	27,366,616	37,308,336	38,433,289
Earnings per share (Frw)	30.49	30.87	34.67	39.5	41.4	42.6
Total assets	561,226,400	638,336,598	727,204,700	877,401,364	1,019,075,587	1,304,004,486

Equity	99,245,545	108,485,600	122,750,132	194,705,081	220,810,886	259,344,020
Total loans of customers	313,925,535	385,824,570	471,704,315	568,104,724	678,005,885	851,099,810
Non-performing loans	15,382,351	17,362,106	26,415,442	27,837,131	38,646,335	57,023,687
Liquid assets	215,595,527	209,462,253	209,618,970	263,791,429	284,835,450	384,065,114
NPL Ratio	**4.9**	**4.5**	**5.6**	**4.9**	**5.7**	**6.7**
Liquidity risk	**0.38**	**0.33**	**0.29**	**0.30**	**0.28**	**0.29**
Operation risk	**0.54**	**0.50**	**0.54**	**0.53**	**0.49**	**0.44**
ROA	**3.65**	**4.11**	**3.21**	**3.12**	**3.66**	**2.95**
ROE	**20.64**	**24.16**	**19.02**	**14.06**	**16.90**	**14.82**
NPM	**34.16**	**36.28**	**28.40**	**29.11**	**32.02**	**26.42**
Equity Bank	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Sales revenue	10,656,433	14,003,809	14,003,809	19,523,471	26,301,174	31,525,295
Net interest income	8,266,945	10,784,711	10,784,711	14,062,302	19,763,411	24,197,388
Net operating income	12,271,704	15,943,309	14,315,002	18,390,494	25,468,907	30,136,489
Net operating expenses	8,128,539	8,710,226	8,710,226	9,824,969	12,210,809	15,286,083
Net income	2,078,197	3,879,268	3,879,268	5,971,758	9,258,355	11,136,515
Total assets	92,821,123	124,861,292	174,997,704	233,136,408	276,100,799	345,399,778
Total equity	20,123,747	22,201,944	26,191,870	32,463,073	41,721,428	52,857,944
Total loans of customers	61,985,814	80,135,606	93,757,315	132,136,317	156,299,235	189,955,663
Nonperforming loans	2,069,931	2,628,307	2,628,307	2,858,287	3,479,640	3,648,710
Liquid assets	23,534,820	37,313,155	73,115,541	85,827,380	110,687,758	141,664,194
NPL Ratio	3.34	3.28	2.8	2.16	2.23	1.92
Liquidity risk	0.254	0.299	0.418	0.368	0.401	0.410
Operation risk	0.662	0.546	0.608	0.534	0.479	0.507
ROA	2.239	3.107	2.217	2.561	3.353	3.224
ROE	10.327	17.473	14.811	18.396	22.191	21.069
NPM	19.502	27.702	27.702	30.588	35.201	35.326
KCB Bank Rwanda	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Sales revenue	13,701,617	15,341,823	15,894,591	17,919,038	21,379,748	23,365,368
Net interest income	7,951,208	9,822,624	10,095,006	10,052,305	14,004,140	14,976,020

Net operating income	13,284,839	14,010,438	13,751,462	16,585,751	20,034,097	18,740,313
Net operating expenses	10,061,516	11,197,669	9,891,702	12,862,483	11,594,626	13,007,624
Net income	2,167,345	1,985,163	1,837,833	1,823,417	6,545,946	4,047,374
Total assets	149,642,709	147,789,100	158,049,646	209,113,658	197,234,414	232,694,730
Total equity	13,425,222	15,410,385	17,248,218	21,135,696	27,717,017	35,582,645
Total loans of customers	90,567,507	93,786,245	98,884,307	110,472,152	135,781,681	150,426,864
Nonperforming loans	2,626,458	6,565,037	3,638,942	6,606,235	7,929,650	7,581,514
Liquid assets	49,073,090	44,275,088	52,076,028	90,686,437	49,879,059	70,308,719
NPL Ratio	2.9	7	3.68	5.98	5.84	5.04
Liquidity risk	0.328	0.300	0.329	0.434	0.253	0.302
Operation risk	0.757	0.799	0.719	0.776	0.579	0.694
ROA	1.448	1.343	1.163	0.872	3.319	1.739
ROE	16.144	12.882	10.655	8.627	23.617	11.375
NPM	15.818	12.940	11.563	10.176	30.618	17.322

Source: financial reports of BK, KCB Bank Rwanda, Equity Bank Rwanda Ltd and I&M Bank Rwanda ,2015-2020

Appendix II: Financial ratios computed from financial statements of selected banks in RSE

Bank name	Year	NPL Ratio(Credit risk)	Liquidity risk	Operation risk	ROA	ROE	NPM	Bank size
I&M Bank	2015	1.39	0.210	0.613	2.737	19.22	29.7	8.24
I&M Bank	2016	2.7	0.329	0.596	3.85	26.07	38.8	8.31
I&M Bank	2017	2.49	0.286	0.573	2.50	18.58	26.6	8.42
I&M Bank	2018	3.12	0.101	0.580	2.53	18.82	24.1	8.47
I&M Bank	2019	3.42	0.148	0.672	1.95	14.50	17.8	8.50
I&M Bank	2020	3.51	0.287	0.694	1.25	9.57	13.3	8.62
BK	2015	4.9	0.384	0.542	3.65	20.64	34.2	8.75
BK	2016	4.5	0.328	0.499	4.11	24.16	36.3	8.81
BK	2017	5.6	0.288	0.542	3.21	19.02	28.4	8.86
BK	2018	4.9	0.301	0.527	3.12	14.06	29.1	8.94
BK	2019	5.7	0.280	0.487	3.66	16.90	32.0	9.01
BK	2020	6.7	0.295	0.441	2.95	14.82	26.4	9.12
Equity Bank	2015	3.34	0.254	0.662	2.24	10.33	19.5	7.97
Equity Bank	2016	3.28	0.299	0.546	3.11	17.47	27.7	8.10
Equity Bank	2017	2.8	0.418	0.608	2.22	14.81	27.7	8.24
Equity Bank	2018	2.16	0.368	0.534	2.56	18.40	30.6	8.37
Equity Bank	2019	2.23	0.401	0.479	3.35	22.19	35.2	8.44
Equity Bank	2020	1.92	0.410	0.507	3.22	21.07	35.3	8.54
KCB Bank Rwanda	2015	2.9	0.328	0.757	1.45	16.14	15.8	8.18

KCB Bank Rwanda	2016	7	0.300	0.799	1.34	12.88	12.9	8.17
KCB Bank Rwanda	2017	3.68	0.329	0.719	1.16	10.66	11.6	8.20
KCB Bank Rwanda	2018	5.98	0.434	0.776	0.87	8.63	10.2	8.32
KCB Bank Rwanda	2019	5.84	0.253	0.579	3.32	23.62	30.6	8.30
KCB Bank Rwanda	2020	5.04	0.302	0.694	1.74	11.37	17.3	8.37

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