

Impact of Financial Risk Management Practices on Financial Performance: Evidence from Commercial Banks in Botswana

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Abstract

The study examined the impact of financial risk management practices on the financial performance of commercial banks in Botswana. The study used Return on Assets and Return on Equity to measure financial performance. Inflation, Interest rates, total debt to total assets, total debt to total equity, total equity to total assets and loan deposit ratios were used as proxies for financial risk management. The research population was all the 10 commercial banks in Botswana and the study covered a period of 8 years from 2011 to 2018. This descriptive study sourced monthly secondary data from Bank of Botswana Financial Statistics database. Descriptive statistics, correlation and regression analyses were applied to analyze the data. The results from regression analysis showed that interest rates had a negative and significant impact on return on assets and on return on equity. On the other hand, total debt to total assets showed a negative and insignificant effect on return on assets. However, total debt to total assets, revealed a positive and insignificant effect on return on equity. The loan deposit ratio indicated a negative and significant impact on return on assets and on return on equity. Findings suggest that banks should strike a proper balance between financial risk management practices and financial performance by engaging in appropriate market, credit, and liquidity risk management practices that will ensure safety for their banks and yield positive profits.

Keywords: financial risk, return of assets, return of equity, commercial banks, Botswana

1. Introduction

The issue of impact of financial risk management on financial performance has seen an extensive amount of empirical investigation in the recent years. The subsequent myriad of such studies signify the important role played by the financial system of a country as a foundation of a functioning and efficient economy. At the heart of an economy's financial system is the banking industry; which in developing countries; is the biggest player in the role of financial intermediation (Hawkins and Mihaljek, 2001). However, Mutukua (2016) postulates that all banks operate in an unstable and fragile environment and confront various risks which may, in one way or the other, lead to the closure of a commercial bank as a result of inability to meet its financial obligations. More importantly, Shah (2014) denotes that in the financial system, there are at least three broad categories of risks being; financial risk, business risk and operational risk. Further, and as noted by Carey (2001), these risk exposures have made banking a business of risk, hence efficient risk management is critical to the survival of commercial banks.

Despite the perceived positive role of risk management on improving bank financial performance, studies in this area have offered inconsistent results. In one end of the spectrum are studies that assert a positive relationship and among others: Kenya (Maritim, 2013; Mwangi, 2014); United Kingdom (Saeed and Zahid, 2016); Nigeria (Adeusi, Akeke, Adebisi & Oladunjoye, 2014; Olamide, Uwalomwa, and Ranti, 2015). The positive role of risk management on bank performance could be seen in terms of better management of funds, and reducing unnecessary costs such as doubtful advances (Mutukua, 2016). At the opposite end are those studies that stress that a negative relationship exists: India (Shetty and Yadav, 2019); Kenya (Muteti, 2014; Juma and Atheru, 2018). The negative relationship could be due to less leverage and risk taking, as risk management practices get tightened and this reduces bank profitability.

In developing economies, where financial sophistication is low, banks play the primary role of moving capital from households to businesses with productive purposes. It is, therefore, imperative that this role is efficient and is maximized to ensure growth in the economy. A large part of this role, therefore, is to assess risks of potential projects and businesses in the economy and appropriately price them to ensure that the projects are correctly funded and

structured, whilst making the investments worthwhile for the funding bank. Therefore, one of the bank's biggest functions is striking the balance of correctly assessing and managing risk whilst creating sustainable profits and value for shareholders (Sinha, 2011).

This particular balance has become increasingly more important in the past 10 years since the Financial Crisis. According to Bank of International Settlements (2018), the 10 years prior to 2008 saw unprecedented growth in the world economy and financial services, largely fueled by risk taking as bankers took more and more risky positions in the pursuit of profits and bonuses. This dis-incentivized banks to do proper risk assessment on projects and that led to the melt down in 2008 which resulted in a global crisis which stalled economies and wreaked havoc on financial markets across the globe. Since then, a greater emphasis and oversight has been placed on risk management at banks and has resulted in passing of regulatory legislation, Basel III, which has called for increased risk management.

Basel III, which had its first version published in 2009 by the Basel Committee on Banking Supervision, is grounded in three main principles to counteract the ills, which causes the financial crisis. The regulation called on for increased minimum capital requirements to absorb possible shocks to a bank's balance sheet, introduced measures to cushion banks as their balance sheets evolved and introduced new regulation on leverage and liquidity management to manage possible excessive borrowing and risky behaviors by banks (Bank of International Settlements, 2011).

As expected, the effects of this regulation have been broad and far reaching. The Committee on the Global Financial System Report Number 60 found that in the decade after the Financial Crisis, the banking sector has evolved. There have been changes in market capacity and structure as most banking sectors shrank, business models have changed with a move away from trading and complex structuring to less capital intensive activities like commercial banking, and across the world, banking profitability has fallen as a result of less leverage and risk taking, but also as a result of a slow-down in most economies during that period (Bank of International Settlements, 2018). The challenge, therefore, across the world, is for banks to manage their risks and avoid another crisis whilst remaining profitable and using their capital as efficiently as possible.

1.1 Commercial Banks in Botswana

Botswana's banking sector has not been immune to the above challenge of increased risk management. The regulatory and supervisory oversight by the Bank of Botswana, which is the regulator of all commercial banks and related institutions, continued to focus on ensuring good governance and appropriate risk-taking by regulated institutions. The banking sector was adequately capitalized, profitable and liquid as at December 31, 2018, and the industry's compliance with the regulatory and prudential requirements was satisfactory (Bank of Botswana Annual Report, 2018).

According to Banking Supervision Annual Report (2018), the number of licensed commercial and statutory banks remained at ten and three, respectively, in 2018, employing, in total, 5 270 people compared to 5 210 in 2017. Banks continued to improve products and service offerings to remain relevant to the demands of the economy and sustain viable and profitable operations due to increased competition in the banking sector, along with evolving customer needs.

Meanwhile, total assets for the banking sector increased by 9.4 percent from P83.5 billion in 2017 to P91.3 billion in 2018, while customer deposits rose by 8.9 percent from P63.6 billion in 2017 to P69.3 billion in 2018, constituting 75.8 percent of liabilities (Banking Supervision Annual Report, 2018). Similarly, loans and advances increased by 7.7 percent from P54.2 billion to P58.3 billion in the same period, faster than the 5.6 percent growth in the prior year and in consequent, the financial intermediation ratio eased from 85.2 percent in 2017 to 84.2 percent in 2018 (Banking Supervision Annual Report, 2018). Notwithstanding, core indicators of financial sector depth and development show that the country's banking sector is relatively small in relation to GDP.

In terms of capital adequacy, banks largely reported capital adequacy and common equity Tier 1 capital ratios in excess of the respective 15 percent and 4.5 percent prudential and statutory minimum requirements, though one bank, had a capital adequacy ratio (of 13.3 percent) which is below the prudential minimum requirement of 15 percent as at December 31, 2018 (Banking Supervision Annual Report, 2018). With regard to credit risk, generally the composite credit risk for the banking sector was considered high and is expected to increase in the short- to medium-term due to the dominance in banks' loan books of the household sector credit, which is mostly unsecured. This makes the banking sector vulnerable to business restructuring and employment risks, particularly for state-owned entities. In the meantime, the return on equity (ROE) and return on average assets (ROA) increased from 12.6 percent and 1.4 percent in 2017 to 16.1 percent and 1.9 percent, respectively in 2018. (Banking Supervision Annual Report, 2018). This indicates that the financial performance ratios were satisfactory over the period and were in line with international norms for banks of comparable size.

However, in an environment of faster annual growth in credit during the year, the banking asset quality, as measured by non-performing loans, deteriorated marginally. In particular, the ratio of non-performing loans to gross total loans and

advances increased from 5.3 percent in 2017 to 5.5 percent in 2018, reflecting, to a significant extent, financial distress in some segments of the business sector (Banking Supervision Annual Report, 2018).

Overall, though the banking sector is sound, there are still issues of high credit risk, banking sector being relatively small in relation to GDP, and that the overall estimation shows that the degree of financial sector development and depth has been largely static in the past five years.

1.2 Problem Statement

Though studies in this topic yielded inconsistent results, the positive role of risk management towards improving financial performance of banks had been evident in most studies as highlighted in literature. Since the Financial Crisis in 2007-2009, the role of risk management has become increasingly more important. With the introduction of Basel III in 2009, tighter regulations have been put in place in so far as they relate to increased minimum capital requirements, new measures to cushion banks as their balance sheets evolved, and introduced new regulation on leverage and liquidity management to manage possible excessive borrowing and risky behaviors. With the tighter regulations, changes in market capacity and structure has evolved as most banking sectors shrank, and business models have changed with a move away from trading and complex structuring to less capital intensive activities (Bank of International Settlements, 2018). The end result was that the world banking profitability has fallen as a result of less leverage and risk taking. Furthermore, this was as a result of a slow-down in most economies during that period. This outcome, therefore, leads to a research question of how risk management practices have affected banks in developing economies such as Botswana, where financial sophistication is low and risk management is imperative in order to boost profits. This study is also expected to unravel the inconsistencies of results in developing nations and also add to a scanty literature therein.

1.3 Significance of the Study

The study has both managerial and academic implications. It is important as it evaluates the effect of financial risk management on the financial performance of commercial banks in Botswana. The study will be of great benefit to management, as it will assist in identifying and controlling the components of financial risks that affect the financial performance of the commercial banks. The study will also help policy makers, as it will throw light on critical components that impact financial performance of the selected financial institutions, thereby enabling formulation of relevant policies. The findings will be of assistance to stakeholders and prospective investors as the study explains critical risk components that influence organizations' financial performance. The study also contributes to the existing literature on the topic.

1.4 Objectives of the Study

The main objective of the study is to measure the impact of financial risk management practices on the financial performance of commercial banks in the Botswana banking sector. The specific objectives were:

1. To assess the effect of market risk management practices on the financial performance of commercial banks in Botswana
2. To assess the effect of credit risk management practices on the financial performance of commercial banks in Botswana
3. To assess the effect of liquidity risk management practices on the financial performance of commercial banks in Botswana

Based on the above specific objectives and reviewed literature, the following hypotheses are developed:

H₁: Market Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.

H₂: Credit Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.

H₃: Liquidity Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.

1.5 Theoretical Review

There are a number of theories that validates the impact of financial risk management on financial performance. A proper appreciation of such theories by an organization's management will enable them to engage in the most appropriate financial risk management practices that will suit the organization. Two of those theories are discussed below:

1.5.1 Finance Distress Theory

According to Baldwin and Scott (1983, p.505), “when a firm’s business deteriorates to the point where it cannot meet its financial obligations, the firm is said to have entered the state of financial distress. The first signals of distress are usually violations of debt covenants coupled with the mission or reduction of dividends”. It is a condition in which an individual or a corporate fails to generate income or revenue as they fail to meet their contractual debt financial obligations. In such a situation, in a corporate context, the enterprises’ financial performance deteriorates, leading to challenges in rising finance and building credibility. From the perspective of commercial banks, inability to honour deposit withdrawals and loan disbursements constitute liquidity risk. Similarly, a credit risk situation arises when the banks have non-performing loans resulting from borrower’s delay in setting their loans. It therefore follows that banks should be vigilant to take care of their liquidity as well as credit risks to avoid any financial distress. According to Whitaker (1999), corrective actions by firm management to improve upon its financial performance are activated by financial distress. The financial distress theory, therefore, is relevant to the study on the relationship between financial risk management and financial performance as it identifies liquidity and credit risks as forecasters of financial distress (Wamalwa and Mukanzi, 2018).

1.5.2 Shiftability Theory of Liquidity

Harold G. Moulton in 1915, developed Shiftability theory (El-Chaarani, 2019). The theory states that banks should invest some of their funds available for investment in securities and credit instruments that have secondary market so that they can be converted to cash as and when a need arises to address declining liquidity. The theory contends that highly marketable securities held by banks is an excellent source of liquidity and that shiftability, marketability or transferability of a bank's assets is a basis for ensuring liquidity (Ibe, 2013). The theory further contends that highly marketable security held by a bank is an excellent source of liquidity. The theory is relevant to a study that focuses on the effect of financial risk on financial performance as it provides a clear explanation as to how liquidity risk affects financial performance using liquidity coverage and net stable funding ratios as stated by new Basel III framework (Olalekan, Mustapha, Irom & Emily, 2018).

1.6 Empirical Literature Review

Academicians and researchers have assessed the impact of financial risk management on the financial performance of organizations in various sectors. Empirical evidences and results of previous studies show a mixed trend on the effect of financial management risk components on the profitability with statistically significant (negative/positive), weak and in some cases with insignificant or no impact of financial risk management practices on financial performance. The literature also indicates that researchers have used a wide variety of proxies for the components of financial risk management that included non-performing loan ratio, loan to total deposit ratio, interest rates, capital adequacy ratio, growth in interest earnings and loan loss provisions to total loans, total debt to equity, non-performing loans to gross loans ratio, Inflation, total debt to total assets, total equity to total assets etc. Return on assets and return on equity were widely used to measure financial performance. The following table provides a bird’s eye view of the findings of some studies on the topic:

Table 1. Summary of findings in prior studies

	Authors	Financial Risk proxies	Findings
1	Shetty and Yadav (2019)	interest rate risk and foreign exchange risk	Inverse relationship between financial risk and profitability
2	Noor (2019)	credit, liquidity market and foreign exchange risks	Positive and significant impact on the financial permanence
3	Mardiana and Dianata, (2018)	Capital adequacy ratio, operating efficiency and non-performing loans	Significant but negative impact of operating efficiency on return on assets, capital adequacy ratio and non-performing loan had a negative and insignificant impact on ROA
4	Matayo and Muturi (2018)	Operational and market risks	Significant effect on the financial performance
5	Mudanya and Muturi (2018)	Credit risk, market risk and liquidity risk	Strong relationship between profitability and credit risk; a strong correlation between profitability and market risk and a statistically significant relationship between profitability and liquidity risk.

6	Lelgo and Obwogi (2018)	credit risk, liquidity risk, interest rate risk and exchange rate risk	Credit risk and interest rate risk negatively influenced the financial performance; liquidity risk and exchange rate risk had positive impacts on financial performance.
7	Juma and Atheru (2018)	Liquidity risk, credit risk, interest rate risk and foreign exchange risk	Positive and significant relationship between liquidity risk and return on assets and interest rate and return on assets; a negative and significant relationship between credit risk and return on assets and foreign exchange risk and return on assets.
8	Wamalwa and Mukanzi (2018)	Credit risk, capital risk, liquidity risk, interest rate risk	Credit risk and capital risk management had a positive significant impact; liquidity management practice and interest rate risk management had a negative with no significant impact on the financial performance.
9	Balungi (2018)	Credit risk	Strong correlation between credit risk management and financial performance
10	Serwadda (2018)	Non-performing loans, growth in interest earnings and loan loss provisions to total loans	Credit risk management influence the performance
11	Kalu, Shieler and Amu, (2018)	Credit risk: credit risk identification, credit risk appraisal, credit risk monitoring and credit risk mitigation	Credit risk identification and credit risk appraisal have a strong positive relationship on financial performance. Credit risk monitoring and credit risk mitigation have a moderate positive relationship with financial performance.
12	Bagh, Khan, and Sadaf, (2017)	Capital adequacy ratio, operational risk, non-performing loans, interest rate risk and liquidity risk.	Risk management practices have significant impact on financial performance
13	Chipa and Wamiori's (2017)	Liquidity risk , operational risk and enterprise risk	All independent variables significantly influence the financial performance
14	Harelimana, (2017)	Credit risk, operational risk, liquidity risk and interest rates	Strong relationship between risk management practices and financial performance
15	Saeed and Zahid (2016)	Credit risk	Positive relationship found between credit risk and performance
16	Perinpanathan and Vijeyaratnam (2015)	Credit risk: Capital adequacy, asset quality, management efficiency, earnings and liquidity	Earnings had a strong positive and capital adequacy, management efficiency, liquidity and asset quality had a negative relationship with financial performance.
17	Iyakaremye (2015)	Debt to equity, debt ratio and Z prime	Z prime had the most significant impact; debt to equity ratio and debt ratio had some impact on the financial performance.
18	Olamide, Uwalomwa, and Ranti, (2015)	Non-performing loan ratio, capital ratio, loan to total deposit ratio and risk disclosure	Coefficient of non-performing loan; loan to deposit, risk disclosure and total asset exhibited an inverse non-significant relationship, whereas capital risk showed a positive insignificant relationship with the return on equity.
19	Adekunle, Alalade, Agbatogun and Abimbola (2015)	Credit risk	Significant effect of credit risk management on financial performance
20	Arif and Showket, (2015)	Management risk, solvency risk, liquidity risk, underwriting risk	Management risk, solvency risk, liquidity risk, underwriting risk, influence performance
21	Yousfi (2015)	credit risk , market risk ,	Positive and significant impact of market risk and a

		liquidity risk and operational risk	negative and significant impact of credit, liquidity and operational risk management practices on return on assets.
22	Haque and Wani, (2015)	credit, capital, solvency, interest rate and liquidity risks	Significant impact of credit, capital and solvency risks on the financial performance; interest rate and liquidity risks did not show any significant effect.
23	Alshatti (2015)	Credit risk: capital adequacy ratio, credit interest /credit facilities ratio, facilities loss/net facilities ratio, leverage ratio and non-performing loans/gross loans ratio	Positive effect of non-performing loans/gross loans ratio on financial performance, a negative impact of facilities loss/net facilities ratio on return on assets, no effect of capital adequacy ratio and credit interest/credit facilities ratio on return on assets, showed an impact of credit interest/credit facilities ratio and the leverage ratio on return on equity.
24	Nair, Purohit and Choudhary (2014)	Various dimensions of risk management	Risk assessment analysis, risk management practices, risk identification and credit risk assessment influence business performance
25	Muteti, (2014),	Liquidity risk, credit risk, interest rate risk, foreign exchange risk	A negative relationship between liquidity risk, credit risk, interest rate risk and foreign exchange risk and financial performance
26	Mwangi (2014)	All components of risk	Strong positive relationship between risk management and financial performance
27	Adeusi, Akeke, Adebisi & Oladunjoye, (2014)	Cost of bad and debt loan, non-performing loan, liquidity, equity-loan asset, debt equity ratio, equity-total asset and managed fund	Inverse relationship between return on capital employed/return on assets/return on equity/ and cost of bad and debt loans. Debt-equity ratio, on the other hand showed a positive and significant relationship with all the dependent variables. Managed funds had a positive and significant relationship with all dependent variables.
28	Maritim (2013)	Credit risk	A positive relationship found between credit risk management and financial performance.
29	Fredrick (2012)	Earnings, capital adequacy, management efficiency, liquidity and asset quality	Earnings had a strong relationship with financial performance and that capital adequacy, management efficiency, liquidity and asset quality had a weak relationship with financial performance.
30	Tafri, Hamid, Meera, and Omar (2009)	Credit risk	Significant impact on performance

The above table provides testimony of mixed trends on the impact of financial risk management practices on financial performance of organizations in banking and other sectors. To summarize, studies on financial risk management and its effect on financial performance by Noor, (2019); Matayo and Muturi (2018); Wamalwa and Mukanzi (2018); Balungi (2018); Serwadda (2018); Kalu, Shieler and Amu, (2018); Bagh, Khan, and Sadaf, (2017); Harelimana, (2017); Saeed and Zahid (2016); Perinpanathan and Vijeyaratnam (2015); Iyakaremye (2015); Adekunle, Alalade, Agbatogun and Abimbola (2015); Haque and Wani, (2015); Alshatti (2015); Nair, Purohit and Choudhary (2014); Mwangi (2014); Maritim (2013); Tafri, Hamid, Meera, and Omar (2009), revealed a statistically significant positive impact of credit risk management on financial performance. A positive relationship signifies that effective credit risk management results in less credit risk, which leads to increased profits (Li & Zou 2014).

Other studies by Mardiana and Dianata, (2018); Lelgo and Obwogi (2018); Juma and Atheru (2018); Yousfi (2015); Muteti, (2014), Adeusi, Akeke, Adebisi & Oladunjoye, (2014), on the other hand, concluded a negative impact of credit risk on financial performance. A negative insignificant relationship between credit risk and financial performance was detected by Olamide, Uwalomwa, and Ranti (2015) and a weak relationship was noted by Fredrick (2012).

Market risk component of financial risk management was also found to have mixed impact on financial performance. A statistically significant positive impact was found by Noor, (2019); Matayo and Muturi (2018); Mudanya and Muturi (2018); Lelgo and Obwogi (2018); Juma and Atheru (2018); Bagh, Khan, and Sadaf, (2017); Harelimana, (2017);

Yousfi (2015); Alshatti (2015); Mwangi (2014) on financial performance by market risk management. The implication is that well-organized market risk management leads to improved financial performance.

A negative impact was highlighted in the studies by Shetty and Yadav (2019); Juma and Atheru (2018); Muteti, (2014). No significant impact of market risk management on financial performance was noticed by Wamalwa and Mukanzi (2018) and Haque and Wani, (2015).

Findings on the impact of liquidity risk as an important component of financial risk management practices on performance also disclosed mixed results. A statistically significant positive effect was found in the studies by Mudanya and Muturi (2018); Lelgo and Obwogi (2018); Juma and Atheru (2018); Bagh, Khan, and Sadaf, (2017); Chipa and Wamiori’s (2017); Harelimana, (2017); Olamide, Uwalomwa, and Ranti, (2015); Arif and Showket, (2015); Mwangi (2014); Adeusi, Akeke, Adebisi & Oladunjoye, (2014). A positive impact of liquidity risk management on financial performance indicates that efficient liquidity risk management leads to increased profitability.

Other studies by Mardiana and Dianata, (2018); Perinpanathan and Vijeyaratnam (2015); Yousfi (2015). Muteti (2014) provided evidence of statistically significant negative impact of liquidity risk management on financial performance, while Fredrick (2012) noted a weak relationship. Studies by Wamalwa and Mukanzi (2018), and Haque and Wani, (2015), underscored an insignificant effect on financial performance.

In view of the above observations, the current study focused on identifying the most common types of risks that form part of financial risk management and measure their influence on the financial performance of commercial banks in Botswana. It may also be noted that very limited research has been conducted in Botswana on this topic. This study, therefore, is tailored to fill the research gap that currently exists in Botswana and to offer recommendations to the banking sector and risk management policy makers on how to manage the components of financial risk management so as to yield more profits.

2. Methodology

2.1 Research Design, Data Source and Sampling

The study is premised on evaluating the effect the financial risk management on financial performance of all commercial banks in Botswana. The study has adopted a panel data methodology (2011-2018) and an analytical and descriptive research design. The study sourced monthly secondary data from Bank of Botswana Financial Statistics (BFS) database. It covered an eight-year monthly data from January 2011 to December 2018. This dataset has resulted in a total of 96 observations (8*12). Convenience-sampling technique was applied based on data availability for all the variables under study.

Secondary data collected comprised of aggregate data for a population of all commercial banks in Botswana for the period under study. There are currently 10 commercial banks operating in Botswana and these are; African Banking Corporation of Botswana Limited (trading as ‘BancABC’), Bank Gaborone Limited, Bank of Baroda (Botswana) Limited, Bank of India (Botswana) Limited, Barclays Bank of Botswana Limited, Capital Bank Limited, First National Bank of Botswana Limited, Stanbic Bank Botswana Limited, Standard Chartered Bank Botswana Limited, and State Bank of India (Botswana) Limited (Bank of Botswana, 2019).

2.2 Conceptual Framework

Drawing from literature and based on the objectives of the study, the following conceptual model has been developed:

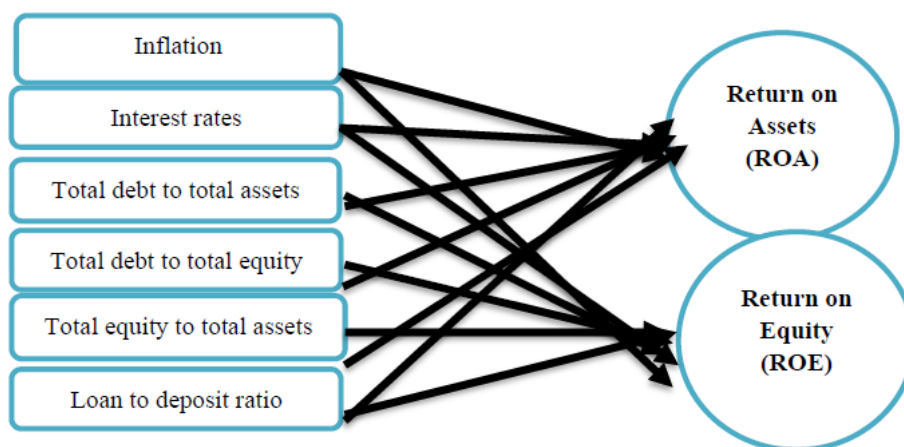


Figure 1. Diagram of Independent & Dependent variables

2.3 Variables and Their Measurements

The independent variables included ratios that measure financial risk such as market risk, credit risk and liquidity risk and were adopted from similar studies as highlighted in the literature review. Market risk was measured by inflation (INF) and real interest rate (INT), Credit risk was measured by the ratio of total debt to total assets (TDTA) and Total debt to total equity (TDTE), while Liquidity risk was measured by Total equity to total assets (TETA) and loan to deposit ratio (LD). Inflation was measured by consumer price index (CPI) while the real prime rate was used as a proxy for interest rates. Correlation analysis and multiple linear regression techniques were used to assess the significance of the relationship between financial risk management and financial performance of commercial banks in Botswana. Table 2 shows a summary of variables used and their measurements.

Table 2. Variables used and their Measurement

Variables	Variable Type	Abbreviation	Measurements
Dependent Variables			
Return on Assets		ROA	Net income / Total Assets
Return on Equity		ROE	Net income/Total Equity
Independent Variables			
Inflation	Market risk	INF	Consumer price index (CPI)
Interest rates	Market risk	INT	Real prime rate
Total debt to total assets	Credit risk	TDTA	Total commercial bank liabilities to total assets
Total debt to total equity	Credit risk	TDTE	Total commercial bank liabilities to total equity
Total Equity to Total assets	Liquidity risk	TETA	Total commercial bank equity to total assets
Loan to deposit ratio	Liquidity risk	LD	Total commercial bank loans and advances to total deposits

2.4 Model for Data Analysis

Model: The regression models are presented in equation 1 and 2:

$$ROA = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \epsilon \tag{1}$$

$$ROE = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \epsilon \tag{2}$$

Where;

X1=INF; X2=INT; X3=TDTA; X4=TDTE; X5=TETA; X6=LD;

α =constant; ε =error term

3. Data Analysis, and Discussion of Findings

Statistical Package for Social Science (SPSS) was used to analyze the data. Descriptive and inferential statistics were used to analyze the data. Importantly, correlation and regression analysis techniques were applied. In the regression model, financial performance, which is the dependent variable, was measured by Return on Total Assets (ROA) and Return on Equity (ROE) respectively. These financial performance ratios have been used in most studies in the area, for example (Yousfi, 2015). Independent variables comprised of selected financial risk management ratios

3.1 Descriptive Analysis

Table 3 is a presentation of the descriptive statistics. The mean value for the return on assets (ROA) is 0.19% while the return on equity (ROE) recorded a mean value of 1.81% over the eight-year period. Since the standard deviations for all the variables are small, it shows that the data is not widely dispersed, except Total debt to total equity ratio (TDTE) and Liquidity (LD) which recorded a higher standard deviations of 58.90% and 9.06% respectively.

Distributional property of the data further indicates positive skewness (skewness statistics) for return of asset (Sk = 0.108), return on equity (Sk = 0.144), inflation (Sk = 0.726), total debt to total assets (Sk = 0.770) and total debt to total equity (Sk = 1.048). Ratio of total equity to total assets, interest rate and liquidity registered negative skewness. The normal distribution is symmetric and has a skewness of zero. If the distribution of a data set has a negative skewness, then the left tail of the distribution is longer than the right tail. Thus, positive skewness implies that the right tail of the distribution is longer than the left. Therefore, the data is to a greater extent, positively skewed.

Meanwhile kurtosis, which measures the thickness of the tail ends of a distribution in relation to the tails of the normal distribution, was positive for all variables except return on assets (kt = -0.1750) and interest rates (kt = -0.3440). The normal distribution has a kurtosis of three, which indicates that the distribution has neither fat nor thin tails. Consequently, if an observed distribution has a kurtosis greater than three, the distribution have heavy tails when compared to the normal distribution. Since all the kurtosis coefficients in Table 3 are less than 3, the data have thin tails when compared to the normal distribution.

Table 3. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
ROA	96	-0.0003	0.0040	0.0019	0.0083	0.1080	0.2460	-0.1750	0.4880
ROE	96	-0.0030	0.0380	0.0181	0.0074	0.1440	0.2460	0.1760	0.4880
INF	96	0.2600	0.0920	0.0484	0.0214	0.7260	0.2460	1.0780	0.4880
INT	96	0.0165	0.0574	0.0372	0.0086	-0.2730	0.2460	-0.3440	0.4880
TDTA	96	0.8790	0.9090	0.8924	0.0064	0.7700	0.2460	0.2050	0.4880
TDTE	96	7.2710	9.9730	8.3299	0.5890	1.0480	0.2460	0.6520	0.4880
TETA	96	0.0910	0.1210	0.1076	0.0064	-0.7700	0.2460	0.2050	0.4880
LD	96	0.5340	0.8760	0.7683	0.0906	-1.1800	0.2460	0.2870	0.4880

3.2 Correlation Analysis

Table 4. Correlations

		ROA	ROE	INF	INT	TDTA	TDTE	TETA	LD
ROA	Pearson Correlation	1							
	Sig. (2-tailed)								
ROE	Pearson Correlation	.916**	1						
	Sig. (2-tailed)	.000							
INF	Pearson Correlation	0.646**	0.780**	1					
	Sig. (2-tailed)	.000	.000						
INT	Pearson Correlation	-0.459**	-0.566**	-0.658**	1				
	Sig. (2-tailed)	.000	.000	.000					
TDTA	Pearson Correlation	0.346**	0.554**	0.689**	-0.545**	1			
	Sig. (2-tailed)	.001	.000	.000	.000				
TDTE	Pearson Correlation	0.350**	0.555**	0.701**	-0.558**	0.996**	1		
	Sig. (2-tailed)	.000	.000	.000	.000	.000			
TETA	Pearson Correlation	-0.346**	-0.554**	-0.689**	-0.545**	-1.000**	-0.996**	1	
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000		
LD	Pearson Correlation	-0.456**	-0.640**	-0.875**	-0.583**	-0.838**	-0.845**	0.838**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	96	96	96	96	96	96	96	96

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

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

The correlation analysis shows the direction and size of the relationship between the data variables. The correlation results are presented in Table 4. All the twenty-eight correlation relationships were strong at 1% level; seventeen of the relationships were negatively correlated whilst the other eleven relationships were positively correlated. The return on assets (ROA) is positively and significantly correlated with return on equity (ROE) ($r = 0.916$). This outcome is

expected since ROA and ROE are theoretically directly related, and this relationship is determined by the equity multiplier (EM), which is the amount of assets per dollar of equity capital (Mishkin and Eakins, 2012).

There were positive and significant correlations at 1% level found between ROA and inflation ($r=0.646$, $p=0.000$), TDTA ($r=0.346$, $p=0.001$) and TDTE ($r=0.350$, $p=0.000$). ROA had negative and significant correlations with INT ($r=-0.459$, $p=0.000$), TETA ($r=-0.346$, $p=0.001$) and liquidity ($r=-0.456$, $p=0.000$).

ROE had positive and significant correlations at 1% level with inflation ($r=0.780$, $p=0.000$), TDTA ($r=0.554$, $p=0.000$) and TDTE ($r=0.555$, $p=0.000$), and negative and significant relationships were observed with interest rates ($r = -0.566$, $p=0.000$), TETA ($r=-0.554$, $p=0.000$) and liquidity ($r=-0.640$, $p=0.000$).

In terms of cross-correlations among the independent variables, strong correlations were found amongst all the independent variables at 1% level. It is worth-noting that when there exist highly correlated independent variables in the model, then multi-collinearity effects are said to exist (Zainodin et al, 2011). The dangers to multicollinearity are that it reduces the precision of the estimate coefficients, which in turn weakens the statistical power of the regression model. Multicollinearity constitutes a threat, both to the proper specification and the effective estimation of the type of structural relationship commonly sought through the use of regression techniques (Farrar & Glauber, 1967).

3.3 Regression Analysis

3.3.1 Multicollinearity

Daoud (2017) defines Multicollinearity as a situation in statistics, when two or more independent variables in multiple regression models are highly correlated. According to Saunders et al. (2012), the simplest diagnostic is to use the correlation coefficients, extreme collinearity being represented by a correlation coefficient of 1. The rule of the thumb is that the presence of high correlations, which is generally anything above 0.90, indicates substantial collinearity. The independent variables that are highly correlated must be dropped from the model. The Variance Inflation Factors (VIFs) were calculated for all the independent variables and, Inflation, Total debt to Total equity and Total equity to Total Assets had VIFs > 5. The three independent variables were dropped from the two regression models. These variables were excluded as their effect can be perfectly predicted from one or more of other independent variables and therefore, considered redundant.

Table 5. Regression Results on the two dependent variables

VARIABLE	ROA			ROE				
	Collinearity Tolerance	Statistics VIF	Coefficient	t-stat.	Sig.	Coefficient	t-stat.	Sig.
Constant			0.027	1.337	0.185	0.052	0.344	0.731
INT	0.650	1.540	-0.307	-2.787	0.006	-0.293	-3.097	0.003
TDTA	0.294	3.405	-0.178	-1.087	0.280	0.004	0.031	0.975
LD	0.276	3.626	-0.426	-2.520	0.013	-0.465	-3.207	0.002
R ²			0.274			0.466		
Adjusted R ²			0.250			0.448		

3.3.2 Dependent Variable: Return on Assets (ROA)

The regression model measured the impact of the independent variables of INT, TDTA and LD on the dependent variable of ROA. The regression output is shown in Table 5.

The model had an R² of 0.274, which implies that the changes to return on assets of 27.4% can be explained by the three independent variables, Interest rates, Total debt to total assets ratio and Liquidity.

The results show statistically significant negative relationships for Interest rates and Liquidity with return on assets. TDTA have a negative but statistically insignificant relationship with return on assets. The regression coefficients for INT, TDTA and Liquidity are -0.307, -0.178, and -0.426 respectively. The p-values of predictor variables were INT, $p= 0.006$, TDTA, $p=0.280$ and Liquidity, $p=0.013$. These results imply that an increase of INT, TDTA and Liquidity has a negative effect on ROA.

The outcomes are in agreement with the findings of Lelgo and Obwogi (2018) who concluded that interest rate risk negatively influenced the ROA. The findings of Wamalwa and Mukanzi (2018) indicate interest rate risk had a negative relationship with no significant impact on return on assets. However, the findings are not consistent with the results of Juma and Atheru (2018) and Yousfi (2015) who concluded that interest rate risk had positive and significant effect on ROA. The study's outcomes are in agreement with the findings of Lelgo and Obwogi (2018), Juma and Atheru (2018), Yousfi (2015) and Tafri, Hamid, Meera, and Omar (2009) who concluded that credit risk negatively influenced the ROA.

However, the study's findings are not consistent with the results of Noor (2018), Kalu, Shieler and Amu, (2018) and Wamalwa and Mukanzi (2018) who concluded that credit risk had positive and significant effect on ROA.

The findings of Yousfi (2015) indicate liquidity risk management had a negative and significant relationship with return on assets that is in line with study's findings. However, the findings of the study are not consistent with the results of Lelgo and Obwogi (2018), Juma and Atheru (2018), Noor (2019) and Adeusi, Akeke, Adebisi & Oladunjoye, (2014) who concluded that liquidity risk had a positive impact on ROA. Tafri, Hamid, Meera, and Omar (2009) concluded that that liquidity risk does not have an impact on the return on assets of commercial banks.

3.3.3 Dependent Variable: Return on Equity (ROE)

The regression model measured the impact of the independent variables of INT, TDTA and LD on the dependent variable of ROE. The regression output is shown in Table 5.

The model had an R^2 of 0.466, which implies that the changes to return on equity of 46.6% can be explained by the three independent variables, Interest rates, Total debt to total assets ratio and Liquidity.

The results show statistically significant negative relationships for Interest rates and Liquidity with return on equity. However, Total debt to total assets ratio has a positive but statistically insignificant relationship with the dependent variable, viz. return on equity. The regression coefficients for INT, TDTA and Liquidity are -0.293, 0.004, and -0.465 respectively. The p-values of predictor variables were INT, $p=0.003$, TDTA, $p=0.975$ and Liquidity, $p=0.002$. These results imply that an increase of INT and Liquidity has a negative effect on ROE whilst Total debt to total assets has a positive effect.

The findings of the study are consistent with the results of Tafri, Hamid, Meera, and Omar (2009) who concluded that interest risk had negative and significant effect on ROE. However, the findings Harelimana (2017) and Yousfi (2015) indicate that interest rate risk had a positive and significant effect on ROE, which differs with results of the study.

The findings of the study are consistent with the results of Kalu, Shieler and Amu (2018) and Harelimana, (2017) who concluded that credit risk had positive effect on ROE. However, the results of the study are not consistent with findings of Yousfi (2015) and Tafri, Hamid, Meera, and Omar (2009) that established a negative and significant for credit risk with return on equity.

The results are in line with the findings of Yousfi (2015) who found that liquidity risk had a negative and significant relationship with return on equity. However, the results of the study are not consistent with findings of Adeusi, Akeke, Adebisi and Oladunjoye (2014) that established a positive and insignificant relationship for liquidity risk with return on equity. According to Harelimana (2017), liquidity has a positive and significant relationship with return on equity, which is not in line with the results of this study. Tafri, Hamid, Meera, and Omar (2009) concluded that that liquidity risk does not have an impact on the return on equity of commercial banks.

3.4 Hypotheses Tests

Table 6. Summary of accepted/rejected hypothesis

Hypothesis	Statement	Results
H ₁	Market Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.	Accepted
H ₂	Credit Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.	Rejected
H ₃	Liquidity Risk management practices have a negative and significant statistical impact on the financial performance of commercial banks in Botswana.	Accepted

Market risk management practices measured by interest rates (real prime rate) had a negative and significant effect on return on assets and return on equity.

Credit risk management practices measured by total debt to total assets ratio had a negative and insignificant effect on return on assets. However, total debt to total assets ratio had a positive and insignificant effect on return on equity.

Liquidity risk management practices measured by commercial bank loans and advances to total deposits ratio (liquidity) had a negative and significant effect on return on assets and return on equity.

4. Conclusion and Recommendation

The main purpose of this study was to assess the role played by risk management practices on financial performance of commercial banks in Botswana. Risk management was assessed in terms of financial risk management, and in particular; credit risk, liquidity risk and market risk in line with Matayo and Muturi (2018) and financial performance was measured by return on assets and return on equity. Negative and significant relationships were expected among the three risk management practices with financial performance. The conclusions were as follows:

In terms of liquidity risk management, a negative and significant relationship was established with financial performance and the findings are in line with the results of Yousfi (2015). However, the results of the study are in disagreement with findings of Adeusi, Akeke, Adebisi & Oladunjoye (2014) that established a positive relationship for liquidity risk with financial performance. Therefore, the implications are that when liquidity risk management practices increase, bank's financial performance goes down. This is due to the fact that greater emphasis and oversight placed on risk management at banks ends up reducing their performance, hence there is an evidence of a tradeoff between safety and financial performance.

Similarly, negative and significant relationships were obtained between market risk measured using interest rate and banks financial performance, indicating that the increase of market risk management practice has resulted in reduced financial performance for commercial banks. However, the findings are not in line with Yousfi (2015), who concluded that interest rate risk had a positive and significant effect on financial performance.

However, credit risk management practices had mixed results by having a negative and insignificant relationship with return on assets in agreement with the findings of Lelgo and Obwogi (2018), Juma and Atheru (2018), Yousfi (2015) and Tafri, Hamid, Meera, and Omar (2009). A positive and insignificant relationship with return on equity in agreement with Kalu, Shieler and Amu (2018) and Harelimana, (2017) who concluded that credit risk had positive effect on ROE. As a result, the outcome of credit risk management on bank financial performance remains inconclusive in this study.

The implication of these findings are that banks should strike a proper balance between risk management practices and financial performance, so that any risk management practices performed by banks should yield more profits. Based on the outcome of this study, we recommend that banks engage in appropriate market, credit, and liquidity risk management efforts that will yield profits for the banks.

4.1 Limitations & Directions for Future Research

Future research could consider more independent variables to adequately capture the effect of financial risk management on the performance of commercial banks in Botswana. Further, an expanded dataset that captures the pre-crisis period of 2008 and the post-crisis could be included to capture any structural differences in the dataset. This expanded dataset could also capture the development of new legislations such as the Basel Accords and any moratoriums induced in the Botswana banking sector in order to shed more light of their impacts on the financial performance of commercial banks.

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