
# THE DETERMINANTS OF NON-INTEREST INCOME AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN BOTSWANA

**BY**

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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE MASTERS OF ARTS DEGREE IN ECONOMICS**

**JULY 2016**

**DECLARATION**

This thesis is my original work and has not been submitted to any other university for a similar or any other degree. The present work is the result of my own investigation, where the work of other people has been used and acknowledgements have been duly made.

THULAGANYO ZELDAH TSHWENEYAGAE

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Signature

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Date

## APPROVAL

This dissertation has been examined and approved as meeting the requirements for the partial fulfilment of Master of Arts degree in Economics.

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## DEDICATION

I wish to dedicate this research paper to my late grandmother Mrs Mosadikhumo Florah Kampura for believing in me and contributing to my academic upbringing. You might not be here with me but you are forever my pillar of strength and my ever flowing source of inspiration. May your soul rest in eternal peace. You will always remain part of my life.

## ACKNOWLEDGEMENTS

God has been so amazing to me during my academic studies. I am therefore grateful for the strength, wisdom and sufficient grace he granted me with to successfully complete my research work.

I would like to extent my heartfelt and sincere gratitude to my supervisors Mr O. Galebotswe and Dr L. Setlhare, who have contributed immensely to the completion of my research work. Your fundamental input, constructive criticism, useful suggestions, guidance and encouragement made this journey an invaluable learning experience. I certainly had a great time working with you and I am truly thankful for your patience, moral and emotional support throughout.

I also want to acknowledge and appreciate my discussants Prof Nair and Dr Bakwena for the constructive criticism, useful comments and contribution in terms of shaping my proposal and also in writing this study. Innermost appreciation goes to all the other members of the Department of Economics for their advice that shed light in other parts of the study.

The support of my friends was pivotal in the completion of this study. Special thanks goes to Obonye Motokwane for being my pillar of strength and for always believing in me and motivating me to work hard in this research work. To Koketso Molefhi and Rosemary Brock, you have shown me that your friendship is priceless; I survived this journey because of your courage and constant advices, thank you so much for believing in.

I am greatly indebted to my sponsors Northern Trust in collaboration with Bank of Botswana and University of Botswana Foundation. Thank you so much for this amazing opportunity which has changed my life tremendously and has given me definite hope for a wonderful future.

Finally, I wish to express my gratitude to my colleagues, the MA CLASS OF 2016, thank you for your support and courage during the challenging times. You made my period of study a fruitful and memorable one. I wish all the best to everyone in your future endeavours and I am looking forward to working with you outside in making a difference in our country.

***ABSTRACT***

*The main objective of this study is to investigate the determinants of non-interest income in Botswana's commercial banks and its association with the financial performance. An empirical analysis is conducted to determine the impact of technological development, bank characteristics and macroeconomic factors on the non-interest income of commercial banks. The study applied an SUR model to panel data for Botswana's largest three commercial banks for the period 2000 to 2014.*

*The main findings are that GDP growth, inflation, ATM development and Equity asset ratio are negatively related to non-interest income. Bank size and one-period lag of ROA, on the other hand, are positively associated with non-interest income in Botswana's commercial banks. However, the coefficients on these variables are statistically insignificant, except in the case of inflation. The empirical results also indicate a negative relationship between non-interest income and financial performance of commercial banks in Botswana. The study recognizes that the attempt of commercial banks to venture into non-interest income activities does not by any means replace their traditional interest income as the main source of revenue but only complements. Hence, the financial performance of banks still depends on the interest income activities.*

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| | |
|---|---|
| ATM | Automated Teller Machines |
| ATMDEV | ATM Development |
| BLUE | Best Linear and Unbiased |
| BoB | Bank of Botswana |
| BoBCs | Bank of Botswana Certificates |
| BSIZE | Bank Size |
| CAPRAT | Capital Assets Ratio |
| DEPTRFEE | Deposit and Transaction Fees Ratio |
| DW | Durbin-Watson |
| ECB | European Central Bank |
| ECM | Error Correction Model |
| EQRAT | Equity asset ratio |
| FCLOADV | Fees and Commissions Income on Loans and Advances Ratio |
| FE | Fixed Effects |
| FNBB | First National Bank Botswana |
| GDP | Gross Domestic Product |
| HHI | Herfindahl-Hirschman Index |
| IID) | Independently and Identically Distributed |
| INFL | Inflation |
| IPS | Im, Pesaran and Shin |
| LLC | Levin, Lin and Chu |

| | |
|---|---|
| LOANRATIO | Loans to Assets Ratio |
| NBFIRA | Non-Bank Financial Institutions Regulatory Authority |
| NIIR | Non-Interest Income |
| RE | Random Effects |
| ROA | Return on Asset |
| ROAA | Return on Average Assets |
| ROE | Return on Equity |
| SUR | Seemingly Unrelated Regression |
| USA | United States of America |
| VIF | Variance-Inflating Factor |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

The banking sector forms an integral part of the financial sector in every economy around the world. The existence of banks and financial intermediaries is quite imperative as they alleviate the problems of channelling funds from agents with excess resources; that is net savers to agents who require the funds, that is the borrowers. Traditionally, the financial performance of banks has relied on income from intermediation activities, that is, net income, which is the difference between interest charged on loans and that paid on deposits. However, deregulation of the financial markets has permitted non-bank financial institutions to offer products and services similar to those offered by the commercial banks. Therefore, increased competition from these entrants continues to squeeze interest margins for commercial banks, thus prompting them to diversify to other sources of income.

According to DeYoung and Roland (2001), market conditions (deregulation), technological advancement, bank characteristics and macroeconomic conditions have required commercial banks to question the conventional way of banking and hence the response was banks had to find new alternatives to sources of revenue, being non-interest income activities in this case. Non-interest income is any revenue that banks produce from activities excluding their core intermediation business (taking deposits and making loans). Examples of non-interest income include; deposit and transaction fees, annual fees, insufficient funds fees, fees for advice, fund management fees, check and deposit slip fees. Moreover, economic and financial market cycles, as well as jurisdiction, which generally influence the interest income, do not have much impact on the non-interest income. Hence, there is growing evidence of diversification from reliance on intermediation (interest) income (Albertazzi and Gambacorta, 2009).

Additionally, over the years, commercial banks, especially in developed countries, have experienced gradual expansion beyond the traditional sources of revenue. Now the commercial banks derive an increased portion of their revenue from non-interest income activities, which includes; fee earnings (fees for mortgage servicing or sales of mutual funds),

trading profit and loss, commissions, and also other non-interest income activities. For instance, Stiroh (2004) stated that the share of non-interest income on operating income in the United States of America commercial banking industry increased from 19% in 1980 to 43% in 2001. Furthermore, the European banking system also experienced an increase in non-interest income from 26% in 1989 to 41% in 1998 (ECB, 2000). According to Smith (2003), non-interest income has been stable, and it has formed a significant portion of the total income of most commercial banks. Therefore, commercial banks in Botswana have, just like their international counterparts, evolved their business models to tap into the non-intermediation sources of income to boost profitability and to ensure their financial stability in the competitive market. This is evidenced by a significant rise of the non-interest income to total income ratio in Botswana commercial banking industry from 17% in 2005 to 39.6% in 2014 (Banking Supervision Annual Report, 2014). Banks are also influenced to increase non-interest income by the desire to reduce risks associated with interest income.

However, as pointed out by DeYoung and Hunter (2003), despite a rapid growth of non-interest income and increased reliance on non-interest income activities at commercial banks, there is still not much understanding as to how non-interest income links to the financial performance of the bank. Moreover, there are still insufficient empirical studies that focus on the impact of non-interest income on banks' financial performance. Therefore, this study investigates the factors that influence non-interest income in commercial banks of Botswana and the role non-interest income plays in the financial performance of commercial banks of Botswana.

### 1.2 Statement of the problem

Commercial banks income is made up of interest and non-interest income. According to the Bank of Botswana Banking Supervision Annual Report of 2014, commercial banks have experienced a decline in their total annual income over the past years. The reduction in total income was primarily because of a 7.4% decline in interest income. This fall in interest income is attributable to regulation and improved technology which allowed non-bank institutions to penetrate the banking sector as well as the expansionary monetary policy of the Bank of Botswana. The benchmark bank rate in Botswana declined from 15.5% in June 2008 to 6% in August 2015 (Bank of Botswana Annual Report, 2015). This prevailing low-interest

rate environment contributes to a decrease in profits of commercial banks. Therefore this influenced commercial banks to seek other sources of income to complement the conventional interest income (Botswana Banking Supervision Annual Report, 2014). Hence the commercial banks in Botswana diversified towards non-interest income activities such as mutual funds sales and fees on foreign exchange trading because this source of income can be used to attain risk diversification, and it is also less prone to economic recession. In Botswana, Banking Supervision Annual Report (2014) claims that introduction of mobile and internet banking has led to an increase in non-interest income.

Despite the increasing reliance of commercial banks on non-interest income, there are, however, a few academic writings that have looked specifically on the impact of the growing presence of non-interest income on the financial performance of commercial banks in Botswana. Most studies carried out in Southern Africa have focused more on other issues relating to commercial banks such as interest rate spread determinants and profit determinants. However, little has been done on non-interest income despite their increasing importance in the banking industry. The studies also do not reveal what exactly determines non-interest income.

Therefore, this study seeks to fill this knowledge gap by investigating the factors that determine non-interest income. The study links non-interest income to the financial performance of commercial banks in Botswana. This study is aimed at aiding commercial banks in their efforts to raise their non-interest income.

### 1.3 Significance of the Study

This study will contribute to the existing literature by investigating the determinants of non-interest income of commercial banks in Botswana. Although these types of studies have been carried out in other Southern African countries, none has been done in Botswana and therefore, this study will aid by providing information about these determinants. Unlike other studies such as DeYoung and Rice (2004) and Atellu (2012) which focused only on the determinants of non-interest income, this study is different because it focuses on both the determinants of non-interest income and the financial performance of commercial banks. Furthermore, this study is important because it will assist bank managers to have a better understanding of the factors that influence non-interest income. Hence, managers will be able to come up with strategic plans to influence non-interest income growth. The findings of this

study can also be used to guide policy formulation to improve the banking industry performance. Lastly, this study may also assist other researchers with useful insights and pertinent literature about the importance of non-interest income within the commercial banking industry of Botswana.

### 1.4 Objectives of the study

The general aim of this study is to investigate the determinants of non-interest income in Botswana's commercial banks and its association with the financial performance. Specific objectives are:

a) To analyse the effect of bank characteristics and market conditions on the non-interest income of commercial banks in Botswana.
b) To study the effect of technological development and macro-economic conditions on the non-interest income of commercial banks in Botswana.
c) To investigate the association between non-interest income and financial performance of the commercial banks in Botswana.
d) To provide policy recommendations.

### 1.5 Hypotheses of the study

The study hypothesizes that;

a) Bank characteristics and market conditions influence non-interest income of commercial banks in Botswana.
b) There is a positive relationship between technological development and non-interest income.
c) There is a positive relationship between macro-economic conditions and non-interest income.
d) There is a positive relationship between non-interest income and financial performance of commercial banks.

### 1.6 Outline of the study

The remaining part of the study proceeds as follows: the overview of non-interest income in Botswana's commercial banks is presented in Chapter two; literature review follows in Chapter three; Chapter four discusses the methods used for data analysis; Chapter five follows with the empirical results and interpretations and finally Chapter six presents conclusion and policy recommendations.

# CHAPTER TWO

# OVERVIEW OF NON-INTEREST INCOME IN BOTSWANA'S COMMERCIAL BANKS

## 2.0 Introduction

This chapter presents an overview of non-interest income of commercial banks in Botswana. The chapter consists of three sections: Section 2.1 presents the characteristics of the banking sector in Botswana Section 2.2 shows the Development of Botswana's Financial and Banking sector. Section 2.3 presents the sources of commercial banks income, non-interest income and financial performance.

## 2.1 Structure of the banking sector in Botswana

The banking industry is an important sector of any economy around the world, and it largely dominates the financial sector, especially in developing countries. The financial sector in Botswana is made up of the banking and the non-banking institutions. It comprises of commercial banks, merchant banks, investment banks, insurance companies, leasing finance institutions, micro lenders, pension funds and statutory banks. Non-Bank Financial Institutions Regulatory Authority (NBFIRA) regulates the non-bank financial institutions. These include among others, stock exchange, pension funds, fund managers, the insurance industry, investment advisory service providers and micro-lending institutions. It plays a significant role of modernizing regulations and providing a regulatory framework for previously unregulated activities.

The commercial banks dominate the banking sector of Botswana. Just like in other developing countries, Botswana's banking sub-sector is oligopolistic, consisting of a few but large players in the market who have enough power to impact the market individually (Legwaila and Mochipisi, 2004). This is measured by the share of total assets, deposits, loans and advances.

There has been an increase in the level of competition in the banking industry of Botswana. However, according to the Banking Supervision Annual Report of 2014, the Herfindahl-

Hirschman Index (HHI) which measures the bank concentration increased from 0.18 in 2013 to 0.20 in 2014, thus showing a decrease in competition in the banking sector. This decrease was due to commercial banks utilizing internally produced funds to diversify into non-interest generating activities (Amidu and Wilson, 2014). However, the government of Botswana established regulations and financial laws to help with stimulation of competition as an attempt to lessen the concern of declining level of competition and oligopolistic features of commercial banks (Botswana Banking Supervision, 2014).

The performance of the banking sector has remained fundamentally robust and healthy as at December 2014. This was evidenced by total banking sector assets increasing by 13.4 percent to P68 billion in 2014, as compared to 3.5 percent growth in 2013, Loans and advances grew by 14.2 percent to P45.1 billion whereas deposits of customers rose by 6 percent to P51.5 billion (Bank of Botswana, 2014). All banks had an increased growth rate of total assets (Botswana Banking Supervision Annual Report, 2014). The Botswana banking sector has changed from high levels of excess liquidity and high-interest rates to a significant reduction in excess liquidity in a low-interest rate environment. The new transition is expected to bring more innovation and also enhance risk management systems in the banks (Bank of Botswana, 2014).

### 2.2 Development of Botswana's Financial and Banking Sector

Commercial banking in Botswana comes a long way since independence when only two banks were operating in the country. These two commercial banks were; Standard Charted bank and Barclays bank which were British by origin (Harvey, 1998). However, in the 1990's other banks penetrated the market, for example; First National Bank Botswana (FNBB) entered the market in 1991 and Stanbic bank entered the market in 1992. According to Jefferis (2010), twelve commercial banks were operating in Botswana in 2010. However, since the banking sector has been expanding even to date, in 2013, two new commercial banks were licensed namely the State Bank of India (Botswana) Limited and the Bank of India (Botswana) Limited and this brought the total number of commercial banks to thirteen. (Bank of Botswana, 2013). However, the number of commercial banks decreased by two to eleven in 2014, namely; ABN AMRO, ABN AMRO Outside Banking Unit, BancABC, Bank

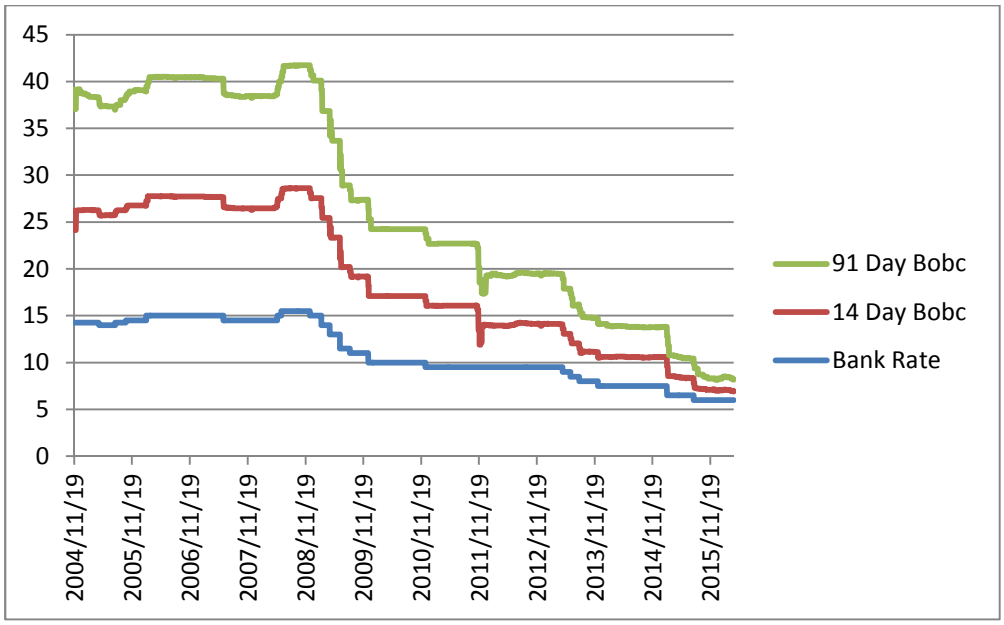
of Baroda, Bank Gaborone, Barclays bank, Capital Bank, First National Bank of Botswana, Stanbic Bank, Standard Chartered Bank and Bank of India (BoB, 2014).The four largest commercial banks in terms of market share are Barclays Bank, First National Bank Botswana, Standard Chartered Bank and Stanbic Bank. These four banks accounted for 81% of both total assets and total loans and advances of market share (Botswana Banking Supervision Annual Report, 2014).

In 1976, Botswana established its own central bank (Bank of Botswana) and its currency, the pula introduced (Harvey, 1998). The Bank of Botswana was established through an act of parliament, and it regulates and supervises the banking institutions by issuing banking licences and undertaking prudential supervision (Botswana Banking Supervision, 2014). The bank has regulatory and monitoring responsibility for commercial banks. It also regulates and supervises other financial institutions such as bureaux de change, deposit-taking microfinance institutions, as well as statutory banks. Also, the central bank performs other duties such as; sole issuance of currency, conducting exchange rate policy, management of foreign exchange reserves and acting as an advisor to the government on issues of financial and monetary policy (Bank of Botswana, 2004).

When it was established, the Bank of Botswana adopted a restrictive monetary policy by setting the prime lending rate and the commercial bank interest rate for deposits. A large amount of revenue from diamond exports mostly influenced the restrictive measures that lead to a significant increase in the level of savings with commercial banks. Low-interest rates policy was therefore proposed to boost economic growth and also encourage sufficient levels of investment. However, in 1989, the Bank of Botswana abandoned the low-interest rate policies, and hence granted commercial banks to independently determine their interest rates, charges and fees. Thus, commercial banks regard the Bank of Botswana Certificates rate and the Bank of Botswana bank rates as key signals for setting their own levels of interest rate. The Bank of Botswana Certificates (BoBCs) were introduced in 1991 in order to absorb excess liquidity in the banking sector. These certificates provided commercial banks with safe investment opportunity as they are liquid and have high-interest rate (Jerries, 2010).

Figure 2.2 shows the behaviour of the Bank Rate and Bank of Botswana Certificates from 2004 to 2015.

Figure 2.2: The behaviour of Bank Rate and Bank of Botswana Certificates rates




Source: Bank of Botswana website

Figure 2.2 shows that the rates move together in such a way that a rise in the Bank rate will prompt the BOBCs rate to increase as well, and the same applies for a decline in the Bank rate. Changes in both of these rates are influenced by the monetary policy system of the central bank where a contractionary monetary policy results in an increase in the Bank rate. However, if the aim of the central bank is to increase money supply in the economy, the Bank rate will be reduced. The average of Bank rate, in Botswana was 10.86 percent between 2006 and 2015, reaching the highest rate of 15.50 percent in 2008 and the lowest rate of 6 percent in 2015. For years, banks have relied heavily on the Bank of Botswana Certificates (BOBCs) to generate interest income. However, the BOBCs decreased in value from P8.7 billion in 2012 to P5.5 billion in 2013, thus leading to a fall in interest income (Bank of Botswana, 2014). Therefore, banks had to seek other alternatives of income rather than being too reliant for their profits on income from BOBCs.

The banking sector in Botswana continues to be highly profitable, and this is evidenced by the profitability indicators, return on equity (ROE) and return on average assets (ROAA). ROE declined from 27.4 percent in 2013 to 19.1 percent in 2014. ROAA declined to 2.3

percent in 2014, compared to 3 percent in 2013. These profitability indicators remain higher than those of similar sized banks in Sub-Saharan Africa despite their downward trend.

According to Bank of Botswana (BoB) (2014), there has been an introduction of new products, enhancement and increase in the quality of services offered by the banks. Some enhancements brought about an increase in the banking delivery channels like internet and mobile banking and automated teller machines (ATMs). There has been an advancement of internet banking which enabled services such as on-line account opening and payment of utilities. Furthermore, better ATM card security features and the ability to deposit cash through ATMs have also been introduced. ATM development has led to an increase in the number of commercial banks ATMs from 391 in 2013 to 420 in 2014 (Bank of Botswana, 2014).

Botswana's banking sector has registered an increase in total income and non-interest income has accounted for an increasing portion of bank revenue. A rise in competition from non-bank financial institutions for non-interest income resulted in commercial banks diversifying from intermediation into fee-earning service to increase profitability.

### 2.3 The Sources of Commercial Banks Income

Commercial banks sources of revenue comprise interest income from loans given out and non-interest income derived from fees and charges from giving financial services (Brownbridge and Harvey, 1998). Interest income and non-interest income are defined as the traditional and non-traditional source of revenue respectively. However, commercial banks differ noticeably in these sources of revenue. Some banks derive income largely from business lending, like mortgages, some from household lending and others from fee-earning activities. Fee-earning activities produce income that banks receive from areas besides their lending operation or activities other than their core intermediation business. Fee income covers a majority of non-interest income. Commercial banks offer their customers services for which commission is charged. This is also a significant source of income. Commercial banks also give out loans to the public, and the yields from loans constitute a majority of the income of a bank.

Previously, commercial banks depended predominantly on traditional sources of income. However, in recent times, banks have shifted from the traditional interest income to more non-traditional sources of revenue, known as non-interest income. Commercial banks in Botswana now operate new banking products that produce non-interest incomes (Botswana Banking Supervision Annual Report, 2014).

The sources of non-interest income have taken a more dominant position in the financial performance of commercial banks. Since 2008, the banking industry in Botswana has registered an increase in total income, and non-interest income has accounted for an increasing portion of bank revenue. The significant rise in total income of banks between 2008 and 2014 was improved by 21% of non-interest income and a 3.8% of interest income (Banking Supervision Annual Report, 2014). In 2010, the increase in non-interest income was primarily because of bank charges and fees charged on customers due to the increased amount of transactions and also the advanced technological products (Banking Supervision Annual Report, 2011).

Table 2.3 shows the trends in the financial performance ratios of Non-interest income to Total income and Interest income to Total income.

**Table 2.3: Trends in Financial Performance Ratios**

| Year | Non-Interest Income to Total Income | Interest Income to Total Income |
|---|---|---|
| 2001 | 3.6 | 78.3 |
| 2002 | 3.8 | 77.4 |
| 2003 | 21.4 | 78.6 |
| 2004 | 22.3 | 77.7 |
| 2005 | 23.4 | 78.9 |
| 2006 | 17.9 | 81.9 |
| 2007 | 17.0 | 83.1 |
| 2008 | 18.6 | 81.4 |
| 2009 | 18.7 | 76.2 |
| 2010 | 34.3 | 65.7 |
| 2011 | 37.3 | 62.7 |
| 2012 | 35.1 | 64.9 |
| 2013 | 36.4 | 63.6 |
| 2014 | 39.6 | 60.4 |

Source: Compiled by the author using Botswana Banking Supervision Annual Reports

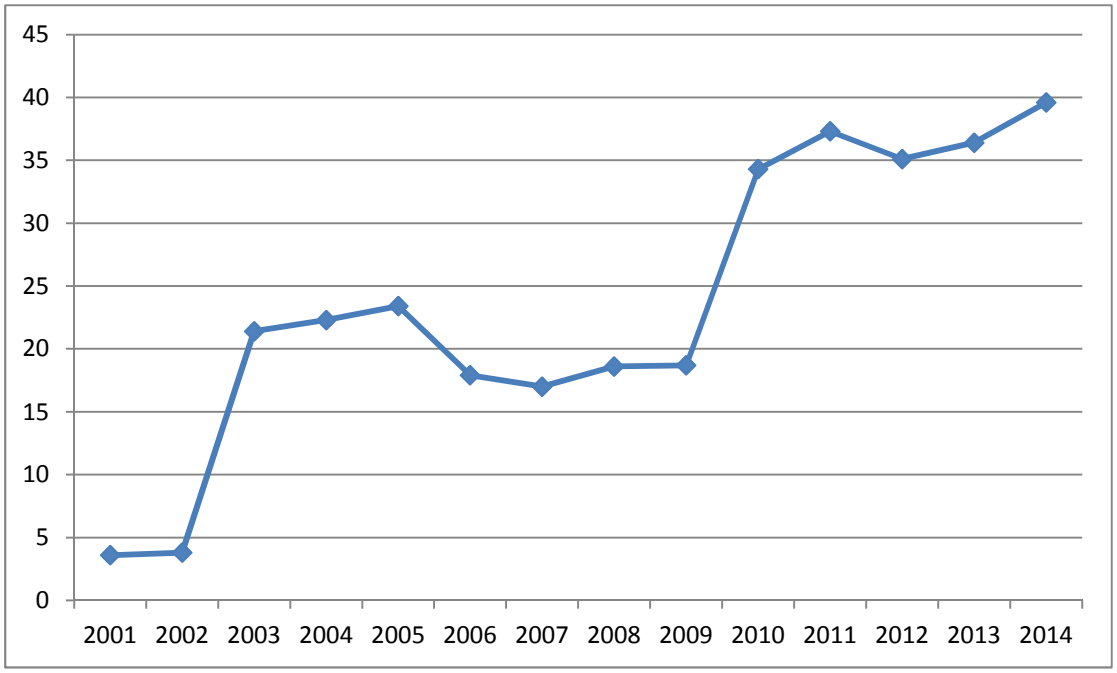
As Table 2.3 shows, non-interest income has increased in importance as a source of bank income. Its share increased from 3.6 percent in 2001 to 39.4 percent in 2014. This represents an increase of 35.8 percent or an average annual increase of 2.75 percent. Much of the increase was realized between 2001 and 2010, which is increased an annual average rate of 3.4 percent. Furthermore, in 2014, the growing reliance by banks on non-interest income to boost profitability is evidenced by a significant increase to 39.6% of non-interest income to total income ratio.

The table shows that in the past five years, non-interest income has trended upwards while interest income trended downwards. However, the increase in non-interest income was slightly lesser between 2013 and 2012. Moreover, the interest income as a share of total income continued to trend downwards to 60.4% in 2014 (Table 2.3). In recent times, the

financial performance of Botswana's commercial banks shows that their non-interest income continued to grow despite the fixed charge ceilings.

Figure 2.3 captures the trend of the ratio of non-interest income to total income. The study employed the ratio so that the relative importance of non-interest income in total income of commercial banks in Botswana is established.

**Figure 2.3: Share of Non-interest income to Total income for Commercial Banks in Botswana, 2001-2014**




Source: Compiled by the author using Botswana Banking Supervision Annual Reports

This figure shows that, until 2005, commercial banks earned 23.4 percent of its income from non-interest sources. However, the share of non-interest income in total income decreased significantly since 2006 to 2009 coinciding with the period of the global economic crisis. By 2007, non-interest income accounted for 17 percent of total income of the commercial banks. This decline in the ratio of commercial banks' non-interest income resulted because of liberalization policies by the Bank of Botswana (such as the reduction of previously high margins of foreign exchange) and competition between commercial banks has increased without any explicit collusion in the market. The share of non-interest income in total income increased remarkably since 2010, coinciding with an era of increased entry by newly licensed commercial banks and also the economic boom.

# CHAPTER THREE

# LITERATURE REVIEW

## 3.0 Introduction

This chapter presents both the theoretical and empirical literature related to the purpose of the study. The theoretical literature discusses a theory that explains the reasons for commercial banks diversification to non-interest income and the factors that influence non-interest income. The empirical literature reviews some previous works on the determinants of non-interest income and how it is associated with the financial performance of commercial banks.

## 3.1 Theoretical Literature Review

### Portfolio Theory

The portfolio theory by Markowitz (1952) can be used to explain the diversification towards non-interest income. The theory assumes that investors are risk averse and that the return on securities is normally distributed, which implies that the portfolio decision is based on the mean and variance analysis. An investor holds a well-diversified portfolio, and is only concerned with expected return and risk of the portfolio. This theory is relevant to a bank's portfolio choice decisions. Banks make a decision of whether to stick to their intermediation roles or diversify to other sources of income based on the expected returns of those choices. If the activities that generate non-interest income are weakly or negatively related to those that generate interest income, then a bank interested in risk reduction may find diversification to non-interest income sources desirable. Similarly, if these activities, unlike those that generate interest income, are counter-cyclical they can thus smooth income flow of the banks (i.e., reduce income volatility). Therefore, adding non-interest income to a bank's revenue stream could reduce its risk and thus smooth its income flow. Consequently, banks augment their revenue stream by adding non-interest income and thus become less risky.

### 3.2 Empirical Review

Empirical analysis of the main determinants of non-interest income or its relationship with bank performance is a relatively new area of research and as such empirical literature is scanty. This section presents a review of some recent literature.

The four main factors that influence non-interest income in the banking industry worldwide comprise of market conditions (deregulations), technological advancement, bank characteristics and macroeconomic conditions (Atellu, 2012). Deregulation is simply the reduction or removal of government power and regulations that control operations in a particular industry. Banking sector deregulation stimulates competition in the financial markets by eliminating restrictions that exploit the development of the banking sector leading to efficiency of the financial goods markets (DeYoung and Rice, 2003).

DeYoung and Rice (2004) analysed the effect of deregulation on the non-interest income of commercial banks in the USA, using a panel data analysis for the period between 1981 and 2001. They found a direct relationship between deregulation and financial performance of a bank. They further suggest that deregulation strengthens competition within the banking industry which requires an equal reaction from the banks to try and stabilize income by increasing their product range. Hence, it is concluded that an improvement in deregulation leads to an increase in non-interest income. Craigwell and Maxwell (2006) conducted a similar study using unbalanced panel data on the link between non-interest income, market conditions, technological change and financial performance of banks between 1985 and 2001 in Barbados. By contrast, the results of this study revealed that deregulation was statistically insignificant which means its deregulation has no effect in non-interest income.

Advances in the level of information and communications technology such as Automated Teller Machines (ATM), internet banking and new intermediation technologies in the form of loan securitization and the introduction and growth of financial instruments and markets promote non-interest income in banks. Sherene and Bailey (2010) conducted a study in Jamaica to analyse the determinants of non-interest income in the Jamaican commercial banks using panel data for the period 1999 to 2010. ATM development was used to proxy technological development, and the results showed technological development to be statistically significant. This means that technology development leads to an increase in non-interest income. Craigwell and Maxwell (2006) conducted a similar study as Sherene and Bailey (2010) and their results were the same. They also found out that the advancement of

technology leads to a stronger level of non-interest income. Therefore, advancement of technology is an important factor determining non-interest income.

Pennathur and Subrah (2012) conducted a study in India on the impact of bank size on non-interest income using unbalanced panel data over the period 2001 to 2009. The results of the study showed that diversification benefits from non-interest income improve with bank's size. By contrast, Chiorazza et al. (2008) found a negative relationship between bank size and non-interest income in the commercial banking system of USA. Just like in the US study, Craigwell and Maxwell (2006) found a negative correlation between non-interest income and bank size using data for Barbados for the period 1985 to 2001. The negative impact of bank size on non-interest income was also found in a study for the USA by Chiorazza et al. (2008).

Furthermore, a study conducted by Kiweu (2012) revealed that macro-economic variables such as rate of inflation and economic growth are significant determinants of non-interest income in Kenya. The study found inflation in Kenya to be negatively and significantly related to non-interest income. This study is supported by studies by Craigwell and Maxwell (2006) who utilized GDP and inflation rate. Sherene and Bailey (2010) found the impact of foreign exchange volatility as a determinant of non-interest income in Jamaican banks from 1999 to 2010.The results showed that the variable was positively significant in determining non-interest income.

There is evidence that non-interest income and financial performance are inter-related. Stiroh (2004a) investigated the relationship between non-interest income and financial performance in United States banking sector for the period 1970 to 2001. The study found a positive relationship between non-interest income and bank insolvency risk, which means that income diversification, increases the insolvency risk of bank. Stiroh (2004a) added that non-interest income is negatively related to a risk-adjusted performance of the U.S commercial banks. Another study conducted in small European banks for the period of 1997 to 2003, revealed an inverse relationship between non-interest income and risk-adjusted bank performance (Mercieca et al, 2007).

Baele et al. (2007) also carried out a study in European banks over the period of 1989 to 2004 to investigate whether income diversification could lead to better performance. They found a direct relationship between income diversification and what the market is anticipating regarding future profits of banks. The study also revealed that income diversification could

reduce the total risk for a lot of banks; however banks with an increased amount of non-interest income had a systematic risk. Chiorazzo et al. (2008) investigated the association between income diversification and the profits of banks in Italy during 1993 to 2003. They found that there is a positive relationship between income diversification and risk-adjusted returns of the banks. A similar study by Elsas et al. (2010) was carried out using the data of nine countries over 1996 to 2008 and they found that income diversification could improve the profitability of banks and their market value.

## 3.3 Synthesis of the Literature

The review of empirical literature indicates that most studies conducted on the determinants of non-interest income include, market conditions (deregulations), bank characteristics, technological development and macro-economic. However, it is worth noting that most empirical studies suggest that these determinants improve non-interest income while other studies suggested the opposite. Deregulation has mixed findings. DeYoung and Rice (2004) using a panel data analysis found a positive relationship between deregulation and non-interest income. However, Craigwell and Maxwell (2006) conducted a similar study and reported that deregulation has no effect in non-interest income.

The literature also presents contradictory results on the relationship between bank characteristics such as bank size and non-interest income. A study by Pennathur and Subrah (2012) on the impact of bank size on non-interest income using unbalanced panel showed that diversification benefits from non-interest income improve with bank's size. By contrast, Chiorazza et al. (2008) and Craigwell and Maxwell (2006) found a negative relationship between bank size and non-interest income. There is a consensus among Craigwell and Maxwell (2006) and Sherene and Bailey (2010) that the advancement of technology leads to a stronger level of non-interest income. Therefore, advancement of technology is an important factor determining non-interest income.

Concerning macro-economic variables; the empirical studies such as Kiweu (2012) Sherene and Bailey (2010) and Craigwell and Maxwell (2006) revealed that such as rate of inflation and economic growth are significant determinants of non-interest income. The empirical evidence as to the impact of non-interest income on the financial performance of banks

provides conflicting results. Stiroh (2004a) and (Mercieca et al, 2007) found an inverse relationship between non-interest income and risk-adjusted bank performance. Baele et al. (2007), Chiorazzo et al. (2008) and Elsas et al. (2010) found that income diversification could improve the profitability of banks and their market value.

# CHAPTER FOUR

# METHODOLOGY

## 4.0 Introduction

This chapter presents the methodology of the study. Section 4.1 presents the data type and sources. Section 4.2 presents the specification of the model. Section 4.3 presents the definitions of the variables used in the study, including prior expectations on the signs of the coefficients for the first and second equation. Section 4.4 is devoted to the explanation of the techniques used in data analysis.

## 4.1 Data Type and Sources

The study uses unbalanced panel of annual data for three commercial banks in Botswana during the period 2000 to 2014. Data sources for banks and macro-economic condition include; the individual bank's balance sheets and income statements, Bank of Botswana (BoB) Annual Reports (for both Research and Banking Supervision Departments) Banking Supervision Annual Reports, Statistics Botswana, annual financial statements of various banks.

The study's sample of three commercial banks includes Barclays Bank of Botswana, First National Bank of Botswana (FNBB) and Standard Chartered Botswana bank. These three banks were chosen considering the fact they are the three largest commercial banks in Botswana in terms of market share and that data is available for the banks in the given study period. These three largest banks dominate the market share of commercial banks with 81% of both total assets and total loans and advances of market share (Botswana Banking Supervision Annual Report, 2014).

## 4.2 Model Specification

In order to envisage the determinants of non-interest income and its relationship with bank performance in Botswana, this study follows the empirical model employed by DeYoung and Rice (2004). The model consists of two separate equations.

The first equation analyses the effect of technological development, bank characteristics, deregulation and macro-economic conditions on non-interest income performance and is specified as:

$$NIIR_{it} = \alpha_1 + \alpha_2\, CAPRAT_{it} + \alpha_3\, BSIZE_{it} + \alpha_4\, LOANRATIO_{it} + \alpha_5\, EQRAT_{it} + \alpha_6\, ATMDEV_{it} + \alpha_7\, GDPGROWTH_t + \alpha_8\, INFL_t + \varepsilon_{it} \ldots (1)$$

$$\varepsilon_{it} = V_i + U_{it}$$

Where; it indexes bank i at time t where i = 1, 2,…, N and t = 1, 2,…,T

NIIR = ratio of non-interest income to total income of the bank

$\alpha_1$= is the constant term

CAPRAT = capital assets ratio as a proxy for deregulation

BSIZE = size of a bank measured as a natural log of total bank assets

LOANRATIO = loans to assets ratio which captures the lending strategy of banks

EQRAT = equity asset ratio as a proxy for efficiency of a bank

ATMDEV = technological development which is the ratio of the total number of ATMs to population

GDP = growth rate captures changes in economic growth

INFL = inflation rate over a period of time in the study

$\varepsilon_{it}$ = disturbance term with $V_i$ representing the unobserved bank specific effects and $U_{it}$ idiosyncratic error that varies over time between banks. This error term is assumed to have zero mean, constant variance and follows a normal distribution (Gujarati, 2009).

The second equation investigates the relationship between non-interest income and financial performance of commercial banks in Botswana and is specified as:

$$ROA_{it} = \beta_1 + \beta_2 ROA_{it-1} + \beta_3 NIIR_{it} + \beta_4 LOANRATIO_{it} + \beta_5 DEPTRFEE_{it} + \beta_6 FCLOADV_{it} + \beta_7 GDPGROWTH_t + \beta_8\, INFL_t + \varepsilon_{it} \ldots (2)$$

$$\varepsilon_{it} = V_i + U_{it}$$

Where; ROA = Return on Assets and proxies the financial performance each bank i in period t

$\beta_1$ = constant term

$ROA_{it-1}$= one-period lagged value of the financial performance measured at time t

NIIR = non-interest income to total income of the bank ratio

LOANRATIO = loans to assets ratio

DEPTRFEE = deposit and transaction fees ratio

FCLOADV = Fees and commissions income on loans and advances ratio

GDP = growth rate captures changes in economic growth

INFL = inflation rate over a specific period of time in the study

$\varepsilon_{it}$ = disturbance term with $V_i$ representing the unobserved bank specific effects and $U_{it}$ idiosyncratic error term with zero mean and constant variance.

In specifying equation (2), the studied observed that some studies have found that the performance of a bank in the current year depends on the performance in the previous year (Flamini et al 2009). This may be due to market structure imperfections or due to other macroeconomic factors such as GDP growth and inflation rate. Therefore this study also captures this possibility by adopting a dynamic model which introduces the one-period lagged value of the dependent variable as an independent variable.

### 4.3 Definition, Measurement and Expected Signs of Variables

#### 4.3.1 Equations 1 Variables

**Dependent variable**

**Non-interest income (NIIR):** this is measured as the ratio of non-interest income to total income of the bank. It is calculated as non-interest income divided by total income of the bank

**Independent Variables and their Expected Signs**

**Bank Characteristics**

**Capital asset ratio (CAPRAT):** is used to measure the effect of deregulation on non-interest income of commercial banks. Increased capital asset ratio means that deregulation level is high and decreased capital asset ratio means that deregulation level is low. A positive relationship between capital assets ratio and non-interest income is expected. This is because deregulation strengthens competition within the banking industry which requires an equal

reaction from the banks to try and stabilize income by increasing their product range. Hence, it is concluded that an increased deregulation leads to an increase in non-interest income.

**Loans to assets ratio (LOANRATIO):** It is used to proxy the bank's lending strategy. A rise in total loans and advances to total asset indicates that the banks are based on interest income as their income strategy. However, if banks' strategy is to diversify its income, it will lead to an increase in non-interest income thus implying a negative relationship between the loans ratio and the level of non-interest income generated by commercial banks (DeYoung and Rice, 2004). Therefore, a negative relationship between loans to asset ratio and non-interest income is expected.

**Bank size (BSIZE):** It is measured as the natural log of bank's total asset and it captures the size effect of commercial banks. A positive sign of the relationship between the size of the bank and non-interest income is expected and it is consistent with the theory of economies of scale. Large bank enjoys economies of scale because with more resources, they are able to invest in profitable investments to produce higher returns and also have better expansion prospects. On the other hand small banks do not enjoy economies of scale as their daily operations are more elastic (Rozzani and Rahman, 2013).

**Equity asset ratio (EQRAT):** This variable is the ratio of equity to total assets. It shows the degree of financial leverage of a bank, which indicates the efficiency of banks. Some studies in income diversification such as Pennathur and Subrah (2012); Chiorazzo et al. (2008) and Busch and Kick (2009) have used this variable and have found that a higher ratio of equity to total assets indicates a high risk aversion and protection to bank default risk. Thus, banks will diversify to non-interest income. Therefore, a positive sign of the relationship between greater equity ratio and non-interest income is expected because an increase in equity asset ratio by banks through issuing more shares will diversify their investments towards non-interest income.

**Technological Development**

**ATM development (ATMDEV):** Technological development is denoted by the ratio of the total number of ATMs to population. Changes in technology that include automated teller machines (ATM), internet banking and new intermediation technologies lead to banks to produce higher levels of non-interest income (Craigwell and Maxwell, 2006). Therefore, a

positive relationship between technological developments and commercial banks non-interest income is expected.

**Macro-economic condition**

**Gross Domestic Product (GDP) growth rate:** GDP growth rate captures changes in economic growth. Economies with high GDP growth rate show a lesser non-interest income as compared to economies with low GDP (DeYoung and Rice, 2004). This shows that when economic growth of a country slows down, banks diversify towards non-interest income. Thus, a negative relationship between GDP growth rate and non-interest income is expected.

**Inflation (INFL):** This variable represents inflation rate over a period of time. Boyd et al. (2001), states that low inflation rate results in a rise of non-interest income in commercial banks. Therefore, the inflation rate coefficient is expected to be negative.

### 4.3.2 Equations 2 Variables

**Dependent variable**

**Return on Asset (ROA):** Financial performance is measured quantitatively on the basis of profit before tax and total assets in a given year. Therefore, ROA is defined as Profit before tax divided by total assets.

**Independent Variables and their Expected Signs**

**Non-interest income (NIIR):** This variable is used as an independent variable in equation 2. It is measured as the ratio of non-interest income to total income of the bank. It is calculated as non-interest income divided by total income of the bank. A positive relationship between non-interest income and bank's financial performance is expected.

**Loans to assets ratio (LOANRATIO):** This explanatory variable is included as a control variable. It is included given the impact of changes in this variable on the profitability of a bank due to changes in loan loss provisioning. The LOANRATIO captures the impact of banks' intermediation strategies on financial performance. It measures the risk as loans are risker and have a higher expected return than other bank assets, thus a positive relationship is expected between LOANRATIO and the performance of a bank.

**Deposit and transaction fees ratio (DEPTRFEE):** This variable is one of the sources of non-interest income. Deposits are the main source of funding for banks and therefore it has an impact on bank's profitability. Deposit and transaction fees ratio is included as an independent variable in this study and a positive sign is expected between this variable and ROA.

**Fees and commissions income on loans and advances ratio (FCLOADV):** It represents the income of the bank as an intermediary or agent for the customer. Fees commissions income ranges from those directly linked to lending and deposit activity such as credit lines and those related to investment banking activities such as trading. A positive relationship between FCLOADV and ROA is expected by the study.

**Gross Domestic Product (GDP) growth rate:** The state of the macroeconomic environment is important in determining financial performance of banks. GDP growth rate acts as a proxy for the business cycle that banks operate in. This is because in times of high economic growth the demand for lending will be high and the asset quality will increase thereby increasing profitability of banks. (Obamuyi, 2013).

**Inflation (INFL):** This is a macroeconomic condition variable and it represents inflation rate over a period of time. Inflation is measured in terms of changes in consumer prices. The impact of inflation on bank profitability depends on whether inflation was fully anticipated by firms. If banks have well anticipated inflation, then there will be a positive relationship between inflation and profits of banks because they would adjust interest rates so as to increase revenues (Flamini et al, 2009). If the inflation was unanticipated, costs could increase due to unadjusted interest rates. This study is expecting a positive association between inflation and profitability of a bank.

### 4.4 Estimation and Testing procedures for data analysis

The model specification in section 4.2 assumes that the explanatory variables are exogenous and the error term follows the classical linear regression assumptions which are; error term is assumed to have mean zero, constant variance, no serial correlation and a normal distribution (Gujarati and Potter, 2009).

Given the structure of data, which is panel data, panel data modelling seems appropriate. The basic panel data estimation approaches are the fixed effects (FE) and random effects (FE) methods. In terms of these approaches an important decision to make is whether to treat the individual bank effects, $V_i$ , as fixed (so that they get relegated to the intercept term of the estimation equation) or random (so that they become part of the error term of the estimation equation).

Thus, the difference between the FE model and the RE model transpires from the assumptions made on these unobserved individual-specific effects. For the fixed effects model, the $\mathcal{V}_i$ are assumed to be fixed parameters to be estimated and part of the intercept term. However, the classical error terms are stochastic and independently and identically distributed (IID), $\mathcal{U}_{it}$ are IID $(0, \sigma_v^2)$. For the random effects model, the $\mathcal{V}_i$ are assumed to be random and, hence, part of disturbances. The $\mathcal{V}_i$ are IID $(0, \sigma_\mu^2)$ and the $\mathcal{U}_{it}$ are IID $(0, \sigma_v^2)$.

It is noted that estimating the above equations with either the FE or RE procedure would be entail considering the model equations one equation at a time. However, such an approach may be inferior to the alternative, in which the two separate equations are considered together, as it may provide additional information. In this regard, the study uses the seemingly unrelated regression (SUR) estimation method proposed by Zellner (1962). The SUR method can capture any statistical interaction between the equations, which may occur if the disturbances of the equations are contemporaneously correlated. Such interaction seems possible, given the recursive structure of the model formulated in this study – non-interest income is allowed to influence bank performance, while bank performance does not influence non-interest income.

Consequently, the study does not implement the FE and RE estimation techniques. Instead, the model equations (1) and (2) are estimated as a system using the SUR estimation method. The SUR approach is used to gain efficiency in estimation by combining information from the two equations, particularly in terms of the relationship between the errors of the equations. In this context, the estimation procedure for the model is the generalized least squares (GLS) estimator. The GLS provides both consistent and efficient estimation of the model parameters, and is implemented as a two-steps estimation method.

The study estimates the two equations for the commercial banking sector in order to examine the determinants of non-interest income and also to determine the relationship between non-interest income and financial performance.

### 4.4.1 Tests Conducted

**Panel Unit Roots Tests**

According to Baltagi (2007), panel data refers to the pooling of observations on a cross-section over several periods of time. There are important reasons why panel data is used and they include; panel data allows for the analysis of the dynamics of individual behaviour. However, the analysis of the dynamics of individual behaviour would not be possible if only cross-section data was used. The other advantage is that panel data increases the number of observations by pooling together data on each cross-section over a period of years thus increases precision in estimation. Lastly, with panel data there is less collinearity among variables.

However, there are problems of non-stationarity of variables when panel data with large time series is used. Non-stationarity refers to having time-varying mean and time-varying variance or both. It is important that variables are stationary because non-stationarity in variables is not desirable; it leads to spurious results (Gujarati and Potter, 2009). Therefore, panel unit root tests are employed to check whether or not variables are stationary. If a variable is non-stationary, it can be found to be stationary after first differencing. If that variable is differenced once and becomes stationary, it is said to be integrated of order 1, represented as I(1), and if a variable is stationary after second difference, it is then said to be integrated of order 2, I(2). If a variable does not need to be differenced to make it stationary, it is then stationary in levels. There are several tests designed specifically for panel unit root testing. These tests include; the Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Madala and Wu (1999), Breitung (2000) and Phillip-Perron (1988).

This study employs the Levin, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS) tests which are the most widely used unit root tests in panel data.

The LLC test proposed by Levin, Lin and Chu (2002) argued that individual unit root test have limited power against the alternative hypothesis, making the variables stationary

especially when the sample size is small. LLC suggested a more powerful panel unit root test for each cross-section, which is specified as;

$\Delta y_{i,t} = \alpha_i + \rho y_{i,t-1} + \sum_{L=1}^{pi} \theta_{i,L} \Delta y_{i,t-L} + \varepsilon_{it} +$

Where; i = 1,2,3,…,N t = 1,2,3,…,T

The hypotheses for testing unit root using the LLC may be specified as follows;

$H_o$: $\rho = 0$ for all i

$H_1$: $\rho < 0$ for $i = 1, 2, 3, \dots, N$

The null hypothesis is that each individual time series has a unit root against the alternative, and hypothesis that the individual time series has no unit root, that is, series is stationary.

The IPS test by Im, Pesaran and Shin (2003) allows for a heterogeneous coefficient of $y_{it-1}$ and propose an alternatives testing technique based on averaging individual unit root test statistics. Since the alternative hypothesis for the LLC test is that each time series is stationary, the alternative hypothesis for the IPS test allows for some (but not all) of the individual series to have unit roots, that is,

$$H_0 \{\rho_i = 0 \text{ for } i = i, \dots, N_1$$

$$H_1 \begin{cases} \rho_i < 0 \text{ for } i = i, \dots, N_1 \\ \rho_i = 0 \text{ for } i = N_{1+1}, \dots, N \end{cases}$$

**Panel Cointegration tests**

After empirically assessing stationarity of variables and finding that the variables became stationary after first differencing, the next step is to test for cointegration between variables. Variables are said to be cointegrated if there exist a long run relationship or equilibrium between them. The panel unit root results showed that most of variables became stationary in first difference form. However it might be possible if the variables share a common trend so that the regression model does not give spurious results. Hence, panel cointegration test is a pre-test to avoid spurious results. Different panel cointegration techniques are used. These tests include the Pedroni (1999, 2000) test and Kao (1999) test. The study tested for panel cointegration of variables which were integrated of order one I(1).

The Pedroni test is applied to variables that were stationary at first difference. Pedroni (1999, 2000) proposed seven test statistics for cointegration in a panel framework. Four of the statistics are called panel cointegration statistics, which are pooled within dimension based

statistics, namely; Panel v-Statistic, Panel rho-Statistics, Panel PP-Statistics and Panel ADF-Statistics (Pedroni, 1999). In case of the panel cointegation statistics, the first order autoregressive term is assumed to be the same across sections. The other three statistics are called group mean panel cointegration statistics, which are between dimension panel statistics, namely; Group rho-statistics, Group PP-Statistics and Group ADF-Statistics. The group mean panel cointegration statistics allow the parameters to vary over the cross sections. The null hypothesis of no cointegration against the alternative of cointegation is tested using the seven statistics. Rejection of the null hypothesis implied the variables are cointegrated.
Also, the Kao test proposed by Kao (1999) is applied to variables of interest to test for cointegration under the null hypothesis of no cointegration.

**Multicollinearity tests**

Practically, multicollinearity refers to the presence of an imperfect linear relationship between some or all explanatory variables in a regression model (Gujarati and Potter, 2009). The particular imperfect multicollinearity that is of concern is high multicollinearity. Perfect multicollinearity violates one of the assumptions of classical linear regression model which asserts that there is no perfect multicollinearity among regressors. High multicollinearity causes practical problems when estimating a model. These problems include; the $R^2$ value of the model being relatively high and relatively large standard error leading to acceptance of the null hypothesis more readily. Hence it is necessary to detect this problem and find an appropriate solution for it. If the correlation coefficient is more than 0.80, it means that there is presence of high multicollinearity between the variables (Baltagi, 2008). The presence of multicollinearity is tested using the correlation matrix and the Variance-Inflating Factor (VIF). VIF above 10 indicates a problem of high multicollinearity.

**Error-Correction Model (ECM)**

An Error Correction model is a dynamic model in which the current state adjusts to the deviation of the variable from its equilibrium relationship with determining variables. (Keele and De Boef, 2004). The ECM models are quite pertinent as they correct short run disequilibrium by providing a consistent integration of short run dynamic adjustment with long run equilibrium specifications. The ECM follows the Granger representation theorem which suggests that if two variables are cointegrated, the association between them can be expressed as ECM. This involves the inclusion of the lagged value of the residual from the cointegrating equation. The coefficient of this error term is expected to be negative such that

if the dependent variable is above equilibrium, it will begin to fall in the next period to restore equilibrium.

**Autocorrelation test**

According to Gujarati and Potter (2009), one of classical linear regression assumptions is that there is no autocorrelation or serial correlation between the disturbance terms. This means that the disturbance terms relating to any observation is not influenced by the disturbance term relating to any other observation. Violation of this assumption leads to what is called serial correlation in the time series context. Therefore it is not ideal to estimate a model when there is presence of serial correlation because the estimates will no longer be best, linear and unbiased (BLUE) and it is most probable that they are insignificant (Gujarati and Potter, 2009). The study conducts a Durbin-Watson (DW) test to check if there is no autocorrelation or serial correlation between the residuals of the model. The hypothesis for this test is that there is no serial correlation. The DW statistic should lie between 0 and 4. These are the bounds of the DW statistic and they are used as a rule of thumb to detect the presence of serial correlation. If the DW value is 2, then there is no serial correlation. But if the DW statistics is 0 or closer to 0, then it is an indication of positive serial correlation. Lastly, if the statistics is 4 or closer to 4, this indicates presence of negative serial correlation.

# CHAPTER FIVE

# EMPIRICAL RESULTS AND INTERPRETATIONS

## 5.0 Introduction

This chapter presents the empirical estimation and the analysis of the empirical results of the study. Section 5.1 reports the descriptive statistics; followed by the multicollinearity test results in section 5.2; section 5.3 reports unit root testing results; section 5.4 presents results from cointegration test; section 5.5 provides the error correction model results; section 5.6 provides the results from the Durbin-Watson test for autocorrelation; section 5.7 provides the model estimation results and also covers the discussion and interpretation of the regression results.

## 5.1 Descriptive Statistics

Descriptive statistics is used in econometrics to describe the basic features of the data in a study. Newbold et al (2007) states that in order to determine if the data tend to centre around some value, the measures of central tendency are used to provide numerical information about the typical observation in the data. Table 5.1 depicts the descriptive statistics results for both the dependent and the explanatory variables.

Table 5.1 Descriptive statistics for total sample

| | **Mean** | **Median** | **Standard Deviation** | **Minimum** | **Maximum** |
|---|---|---|---|---|---|
| **NIIR** | 32.32 | 29.60 | 9.73 | 18.60 | 50.80 |
| **CAPRAT** | 16.48 | 16.80 | 2.91 | 9.30 | 23.00 |
| **LOANRATIO** | 25.18 | 6.80 | 32.90 | 0.14 | 93.10 |
| **EQRAT** | 13.35 | 13.35 | 4.68 | 7.00 | 21.40 |
| **BSIZE** | 9.85 | 9.92 | 0.29 | 9.31 | 10.45 |
| **ATMPOP** | 98.67 | 99.50 | 51.46 | 34.00 | 201.00 |
| **GDP** | 4.26 | 4.63 | 4.01 | -7.84 | 8.68 |
| **INF** | 8.11 | 8.03 | 1.91 | 5.20 | 12.70 |
| **ROA** | 3.89 | 4.00 | 0.90 | 2.35 | 5.90 |
| **DEPTRFEE** | 4.71 | 4.85 | 1.35 | 2.30 | 6.80 |
| **FCLOADV** | 10.83 | 4.45 | 12.80 | 0.00 | 42.00 |

The variables in Table 5.1 are NIIR, which is the non-interest income ratio, CAPRAT is the capital asset ratio, BSIZE is size of a bank measured as a natural log of total bank assets, LOANRATIO represents the loans to assets ratio, EQRAT is the equity asset ratio, ATMDEV denotes technological development which is the ratio of the total number of ATMs to population, GDP growth rate captures changes in economic growth and INFL represents inflation rate over a period of time in the study, ROA represents Return on Assets, DEPTRFEE is deposit and transaction fees ratio, FCLOADV denotes Fees and commissions income on loans and advances ratio.

The table shows that the mean non-interest income ratio is 32.32 and a standard deviation of 9.73. ROA has a mean of 3.89 and a standard deviation of 0.90. The standard deviation of ROA indicates that all the commercial banks in Botswana have a positive value. In this case, a high value of standard deviation implies greater spread of data whereas a lower standard deviation indicates that data is concentrated around the mean. Therefore, in this study, the commercial banks have positive and also a low standard deviation which means that the profits are high and spread tightly around the mean. A commercial bank with the most performance has an average of 5.90 while the bank with the least financial performance has a value of 2.35.

Looking at some of the independent variables; CAPRAT in commercial banks had an average of 16.48 and the maximum is 23. This is a positive feature; hence, it means that commercial banks in Botswana on average satisfy the minimum requirement of 15% as stipulated by the Bank of Botswana. On average GDP growth rate is positive but it showed a minimum value of negative 7.84 due to the 2008/09 economic crises. The mean value of EQRAT variable is relatively high (13.35) during the period of study due to strict regulations of the banking sector in Botswana. LOANRATIO variable has the mean less than 50 percent (25.18) which may also be an indication of strict regulatory rules in the banking sector and also it may indicate conservative risk attitude of deposit bank managers.

### 5.2 Multicollinearity Tests Results

Multicollinearity is defined as the presence of a perfect or less than perfect linear relationship between some or all explanatory variables in a regression model (Gujarati and Potter, 2009). A correlation test is therefore conducted to find out if there is presence of a perfect or less

than perfect relationship among the explanatory variables of the model. According to Baltagi (2008), multicollinearity only becomes a concern if correlation coefficient of a regression model is greater than 0.80. To test the independence of the explanatory variables or to detect the presence of multicollinearity in the regression model the study is using the correlation matrix and the Variance-Inflating Factor (VIF).

Table 5.2 presents the Pearson Correlation Matrix for the sample.

| | CAPRAT | LOAN RATIO | EQRAT | BSIZE | ATMPOP | GDP | INF | DEPTRFEE | FCLOADV |
|---|---|---|---|---|---|---|---|---|---|
| CAPRAT | 1 | | | | | | | | |
| LOANRATIO | -0.222 | 1 | | | | | | | |
| EQRAT | -0.374 | -0.122 | 1 | | | | | | |
| BSIZE | 0.146 | 0.027 | -0.321 | 1 | | | | | |
| ATMPOP | -0.087 | 0.694 | -0.306 | 0.372 | 1 | | | | |
| GDP | 0.135 | 0.020 | -0.127 | 0.176 | -0.061 | 1 | | | |
| INF | -0.334 | -0.090 | 0.399 | -0.092 | -0.128 | 0.019 | 1 | | |
| DEPTRFEE | -0.224 | 0.457 | 0.191 | 0.164 | 0.536 | -0.370 | 0.125 | 1 | |
| FCLOADV | 0.232 | -0.452 | 0.212 | -0.786 | -0.600 | -0.102 | -0.076 | -0.246 | 1 |

Table 5.2: Pearson Correlation Matrix

The table shows that there is no evidence of multicollinearity between the explanatory variables since the coefficients are all less than 0.80. Alternatively, the degree of multicollinearity among variables can be detected using the variance inflating factor (VIF).

Another way of detecting multicollinearity is by using the variance inflating factor. The formula for calculating the $VIF_j$ for each variable is:

$$VIF_j = 1/(1-R_j^2)$$

Where; $R_j^2$ is the multiple coefficient of determination for the model

Table 5.3 shows the Variance-Inflating Factor to detect the degree of multicollinearity among variables.

Table 5.3: Variance-Inflating Factor

| **Variable** | **$R^2$** | **VIF** | **Decision** |
|---|---|---|---|
| EQRAT | 0.82 | 5.56 | No multicollinearity |
| LOANRATIO | 0.53 | 2.13 | No multicollinearity |
| DEPTRFEE | 0.64 | 2.78 | No multicollinearity |
| FCLOADV | 0.60 | 2.50 | No multicollinearity |
| LNATMPOP | 0.34 | 1.51 | No multicollinearity |
| CAPRAT | 0.47 | 1.89 | No multicollinearity |
| BSIZE | 0.87 | 7.69 | No multicollinearity |
| GDP | 0.67 | 3.03 | No multicollinearity |
| INF | 0.81 | 5.26 | No multicollinearity |

The possible extent of multicollinearity among the explanatory variables is also examined using the Variance Inflating factor (VIF) in Table 5.3. The variance inflating factor exhibits the degree to which the standard error of the coefficient of interest has a variance that has been inflated upwards. VIF above 10 indicates a problem of high multicollinearity. However, Table 5.3 shows that there is no evidence of multicollinearity between the explanatory variables since the coefficients of interest show lower VIF suggesting that there is no multicollinearity in the variables of interest.

### 5.3 Panel Unit Root Tests Results

The current study adopted two types of panel unit root tests to test for stationarity of the data. As discussed in chapter four sections 4.4.1, for the common unit root process, the current study used the LLC test by Levin, Lin and Chu (2002) and for the individual unit root process the study used the IPS test by Im, Pesaran and Shin (2003) to test for stationarity for the panel data.

The panel unit root tests were conducted on both the individual effects only and the individual effects and trend to see their performance. The results of the unit root tests are

presented in Table 5.3.1 and Table 5.3.2. The variables used include; non-interest income ratio (NIIR), return on assets (ROA), capital asset ratio (CAPRAT), loan asset ratio (LOANRATIO), equity asset ratio (EQRAT), gross domestic product (GDP growth), log of ATM development per population (LNATMPOP), rate of inflation (INF), Bank size (BSIZE), Deposit and transaction fees ratio (DEPTRFEE) and Fees and commissions income on loans and advances (FCLOADV).

Table 5.3.1: Levin, Lin and Chu Unit Root Test Results

| **Variables** | **Levels** | | **First Difference** | **Order of Integation** |
|---|---|---|---|---|
| | **Indiv.Effects only** | **Indiv.Effects and Trend** | **Indiv.Effects only** | |
| NIIR | -1.01 | -0.83 | -5.24[a] | I(1) |
| ROA | -0.72 | -0.41 | -4.73[a] | I(1) |
| CAPRAT | -2.22[b] | -3.18[a] | -7.47[a] | I(0) |
| LOANRATIO | -0.08 | 0.31 | -4.56[a] | I(1) |
| EQRAT | -2.27[b] | -1.34[c] | -2.48[a] | I(0) |
| GDP | -5.91[a] | -5.11[a] | -6.13[a] | I(0) |
| LNATMPOP | -1.93[b] | -26.16[a] | -10.41[a] | I(0) |
| INF | -4.99[a] | -4.75[a] | -6.44[a] | I(0) |
| BSIZE | -0.64 | 1.27 | -2.51[b] | I(1) |
| DEPTRFEE | -2.07[b] | -2.12[b] | -2.30[b] | I(0) |
| FCLOADV | -1.66 | -1.21 | -3.14[a] | I(1) |

The variables were stationary at 1%, 5% and 10% represented as a, b and c respectively.

According to the LLC test, the unit root test conducted under levels shows six of the variables were significant both with individual effects only and individual effects and trend. These variables include; CAPRAT, EQRAT, GDP, INF and DEPTRFEE which were significant at 1% level of significance and LNATMPOP was significant at 5% level of significance. Therefore, the null hypothesis of no stationarity is rejected and the study concludes that the series is stationary. However, the rest of the variables became stationary after first differencing. These variables are; NIIR, ROA, LOANRATIO, BSIZE and FCLOADV which became stationary after first difference at 1% level of significance for individual effects only.

Table 5.3.2 Im, Persaran and Shin Unit Root Test Results

| **Variables** | **Levels** | | **First Difference** | **Order of Integration** |
|---|---|---|---|---|
| | **Indiv. Effects Only** | **Indiv.Effects and Trend** | **Indiv.Effects only** | |
| NIIR | 0.15 | 0.24 | -3.66[a] | I(1) |
| ROA | -0.82 | -0.31 | -3.32[a] | I(1) |
| CAPRAT | -1.30[c] | -1.79[b] | -5.65[a] | I(0) |
| LOANRATIO | 0.77 | 0.72 | -2.16[a] | I(1) |
| EQRAT | -0.78 | 0.23 | -1.48c | I(1) |
| GDP | -4.02[a] | -2.75[a] | -4.36[a] | I(0) |
| LNATMPOP | -0.44 | -5.45[a] | -5.53[a] | I(0) |
| INF | -3.38[a] | -2.35[a] | -5.40[a] | I(0) |
| BSIZE | 1.27 | 1.02 | -2.51[a] | I(1) |
| DEPTRFEE | -2.07[a] | -2.12[a] | -2.30[a] | I(0) |
| FCLOADV | 0.04 | 0.05 | -1.60[b] | I(1) |

The variables were stationary at 1%, 5% and 10% represented as a, b and c respectively.

The unit root test based on IPS shows that the variables NIIR, ROA, LOANRATIO, EQRAT, BSIZE and FCLOADV were stationary after first differencing under the individual effects only at 1% level of significance whereas the remaining variables were stationary at levels. When the trend was introduced to the individual effects, variables became stationary at levels. Unlike the LLC, the IPS allows for heterogeneity and it is more efficient on balanced panels. Variables which are non-stationary at levels but stationary in their first-difference form, indicate that there might exist a long run relationship between the variables and therefore cointegration test should be carried out.

### 5.4 Cointegration Tests Results

Cointegrated variables refer to variables that have a long-run or equilibrium relationship. As discussed in chapter four sections 4.4.1, the study employed the Pedroni residual cointegration test and the Kao residual cointegration test to determine whether a cointegrating relationship exists among the relevant panel regressors. The results of the panel unit root tests showed that the only variables that were stationary after first differencing were the non-

interest income ratio (NIIR), return on assets (ROA), loan asset ratio (LOANRATIO), equity asset ratio (EQURAT), bank size (BSIZE) and Fees and commission income on loans and advances (FCLOADV). These non-stationary variables were used to test for cointegration using the Pedroni and the Kao test. Table 5.4.1 shows results from the Pedroni cointegration test. Table 5.4.2 shows results from the Kao cointegration test.

Table 5.4.1: Pedroni Residual Cointegration test

| Alternative hypothesis: common autoregressive coefficients. (within-dimension) | | | | | |
|---|---|---|---|---|---|
| | | | | Weighted | |
| | | Statistic | Prob. | Statistic | Prob. |
| Panel v-Statistic | | -1.668050 | 0.9523 | -1.582400 | 0.9432 |
| Panel rho-Statistic | | 1.544841 | 0.9388 | 1.492490 | 0.9322 |
| Panel PP-Statistic | | -5.894357 | 0.0000 | -6.126633 | 0.0000 |
| Panel ADF-Statistic | | -1.735542 | 0.0413 | -2.093127 | 0.0182 |
| | | | | | |
| Alternative hypothesis: individual autoregressive coefficients. (between-dimension) | | | | | |
| | | | | | |
| | | Statistic | Prob. | | |
| Group rho-Statistic | | 1.987329 | 0.9766 | | |
| Group PP-Statistic | | -8.377624 | 0.0000 | | |
| Group ADF-Statistic | | -2.875814 | 0.0020 | | |

The results in Table 5.4.1 show that there are seven tests in total and in these tests there are eleven outcomes which will all be considered. The null hypothesis is that there is no cointegration and the alternative hypothesis states that there is cointegration. Now looking under panel v-statistic, the probability value is 0.9523, so the null hypothesis cannot be rejected; rather the null hypothesis is accepted meaning that there is no cointegration among the variables being tested. The probability of 0.9388 under panel rho-statistics also means that the null hypothesis cannot be rejected. However the probability value of 0.0000 under panel PP-statistics is significant at 1% significance level, so the null hypothesis can be

rejected and accept the alternative hypothesis. This means that variables are cointegrated. Therefore, out of eleven (11) outcomes, only six (6) are significant, meaning that the null hypothesis is rejected and the alternative is accepted. Since majority rejects the null hypothesis, hence we take the decision that we should reject the null hypothesis of no cointegration. Therefore, the results from the Pedroni test imply that there is cointegration among the I(1) variables.

The other test that is used to determine whether a cointegrating relationship exists among the relevant panel regressors is the Kao residual cointegration test. The difference between these two variables is that the Kao test assumes homogeneity. The results from the test are as follows;

Table 5.4.2: Kao Residual Cointegration Test

| | t-statistic | Probability |
|---|---|---|
| ADF | -2.0079 | 0.0223 |
| Residual variance | 17.0146 | |
| HAC variance | 5.5108 | |

The results in Table 5.4.2 show that the probability value of the t-statistic for the Kao test is 0.0223 and this is significant at 5% significance level. Therefore, the null hypothesis of no cointegration is rejected. The results of the Kao test therefore imply that there is cointegration among the variables NIIR, ROA, LOANRATIO, EQURAT, BSIZE and DEPTRFEE. The two cointegration tests give the same outcomes of the results; they both concluded that there is cointegration among the variables.

### 5.5 Error Correction Model (ECM) Results

The cointegration tests showed that variables are cointegrated, therefore an Error correction model is specified. An Error Correction model is a dynamic model in which the current state deviates from its long-run equilibrium into its short-run dynamics (Keele and De Boef, 2004). Therefore, following the non-stationarity of the variables and the ambiguous results when testing for cointegration, ECM is estimated as it will serve to confirm, or not confirm, the existence of cointegration among model variables. When the ECM representation is

supported by the data, it would mean that cointegration exists among the variables of the model. Table 5.5 shows results from the Error Correction Model:

Table 5.5: Error Correction Model

Model 1: Non-interest income Ratio (NIIR)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(LOANRATIO(-1)) | 0.139637 | 0.174727 | 0.799172 | 0.4505 |
| D(EQRAT(-1)) | 0.752132 | 0.593220 | 1.267881 | 0.2454 |
| D(BSIZE(-1)) | 9.542916 | 22.97424 | 0.415375 | 0.6903 |
| U(-1) | -1.185688 | 1.584882 | -0.748124 | 0.4788 |

Model 2: Return on Assets (ROA)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(FCLOADV(-1)) | 0.239028 | 0.069896 | 3.419754 | 0.0091 |
| D(LOANRATIO(-1)) | 0.048169 | 0.014249 | 3.380479 | 0.0096 |
| U(-1) | 1.000545 | 0.130294 | 7.679158 | 0.0001 |

For there to be evidence of a cointegrating relationship between the variables the coefficient of the error correction term, U(-1) should be negative and significant (Gujarati, 2011). The results for model 1 show that the coefficient of the error correction term is negative, but statistically insignificant, while it is positive and significant in model 2. This therefore confirms that there is no cointegration among model variables, hence, the Pedroni test results which suggested that there is cointegration is rejected.

### 5.6 Test for Autocorrelation

Autocorrelation is a situation where the error term is correlated over successive time intervals; in the case of time series data it results in serial correlation. Therefore, if errors are correlated with one another, it is said that they are auto correlated. To test for the presence of autocorrelation, the Durbin-Watson (DW) test is employed for model 1. According to

Gujarati (2011), the DW statistic should lie between 0 and 4. There are the bounds of the DW statistic and they are used as a rule of thumb to detect the presence of serial correlation. If the DW value is 2, then there is no serial correlation. But if the DW statistics is 0 or closer to 0, then it is an indication of positive serial correlation. Lastly, if the statistic is 4 or closer to 4, this indicates a presence of negative serial correlation. Table 5.6 shows the results of the autocorrelation test.

Table 5.6: Durbin-Watson Test for Autocorrelation Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 4.956805 | 22.20925 | 0.223187 | 0.8266 |
| CAPRAT(-1) | 0.283867 | 0.441267 | 0.643299 | 0.5304 |
| LNATMPOP(-1) | 1.234932 | 2.166462 | 0.570023 | 0.5777 |
| GDP(-1) | 0.631898 | 0.252037 | 2.507162 | 0.0251 |
| INF(-1) | 0.013216 | 0.692742 | 0.019077 | 0.9850 |
| D(LOANRATIO(-1)) | -0.085265 | 0.270299 | -0.315448 | 0.7571 |
| D(EQRAT(-1)) | 0.053882 | 0.387219 | 0.139151 | 0.8913 |
| D(BSIZE(-1)) | 28.66721 | 23.64737 | 1.212279 | 0.2455 |
| R-squared | 0.546814 | Mean dependent var | | 1.148182 |
| Adjusted R-squared | 0.320221 | S.D. dependent var | | 5.977424 |
| S.E. of regression | 4.928310 | Akaike info criterion | | 6.303157 |
| Sum squared resid | 340.0353 | Schwarz criterion | | 6.699900 |
| Log likelihood | -61.33473 | Hannan-Quinn criter. | | 6.396618 |
| F-statistic | 2.413197 | **Durbin-Watson stat** | | **2.344963** |
| Prob(F-statistic) | 0.076127 | | | |

### Model 1: Non-interest income Ratio (NIIR)

The results of the estimation show that the DW statistics of model 1 is 2.344. Using the rule of thumb, the value of the model indicates there is no autocorrelation in the data. Therefore, the data is suitable for running regression analysis as the DW is above 2 in the model.

### 5.7 Model Estimation Results

Table 5.7 reports the regression outcome using NIIR and ROA as dependent variables.

**Table 5.7: Model Estimation Results**

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| **Dependent Variable: D(NIIR)** | | | | |
| C | 0.278814 | 17.18860 | 0.016221 | 0.9872 |
| LNATMPOP | -1.077930 | 1.737612 | -0.620352 | 0.5409 |
| GDP(-1) | -0.058966 | 0.191485 | -0.307940 | 0.7608 |
| INF(-1) | -1.235731 | 0.492458 | -2.509315 | 0.0193 |
| D(EQRAT) | -0.086088 | 0.249787 | -0.344644 | 0.7334 |
| D(BSIZE(-1)) | 10.31294 | 10.42510 | 0.989242 | 0.3324 |
| **Dependent Variable: D(ROA)** | | | | |
| C | 0.816500 | 0.811893 | 1.005674 | 0.3246 |
| D(NIIR) | -0.162156 | 0.058610 | -2.766693 | 0.0107 |
| DEPTRFEE(-1) | 0.187952 | 0.109398 | 1.718049 | 0.0987 |
| GDP(-1) | 0.055831 | 0.031390 | -1.778629 | 0.0880 |
| INF(-1) | 0.188169 | 0.066899 | -2.812716 | 0.0096 |
| D(FCLOADV(-1)) | 0.123800 | 0.140190 | 0.883087 | 0.3859 |
| D(LOANRATIO(-1)) | 0.059719 | 0.030357 | 1.967259 | 0.0608 |
| D(ROA(-1)) | 0.013304 | 0.213189 | 0.062405 | 0.9508 |
| Determinant residual covariance | | 3.534564 | | |

| | | | |
|---|---|---|---|
| R-squared | 0.309605 | Mean dependent var | 1.130400 |
| Adjusted R-squared | 0.127922 | S.D. dependent var | 5.664949 |
| S.E. of regression | 5.290219 | Sum squared resid | 531.7419 |
| Durbin-Watson stat | 2.086571 | | |

| | | | |
|---|---|---|---|
| R-squared | 0.666090 | Mean dependent var | 0.065385 |
| Adjusted R-squared | 0.198615 | S.D. dependent var | 0.734593 |
| S.E. of regression | 0.657609 | Sum squared resid | 2.162245 |
| Durbin-Watson stat | 0.975275 | | |

Table 5.7 shows the results of the model using the Seemingly Unrelated Regression (SUR) estimation method. Turning to the estimated model parameters, it is observed that the majority of the coefficients are insignificant and are almost inconsistent with the expected outcome of the variables.

This study will firstly focus on the non-interest income ratio equation and then discuss the return on assets equation. The results for model 1 show that there are two statistically insignificant variables which were dropped from the model estimation namely, capital asset ratio and loan asset ratio. As shown in Table 5.6 of the Durbin-Watson (DW) test for serial correlation, there was no evidence of serial correlation for model 1. Looking at the results now, the DW statistics is 2.0 using NIIR as the dependent variable. DW statistic of two or values close to two is an indication of the absence of serial correlation, therefore in this case, there is no serial correlation. Considering Table 5.6, the probability value of the F-test for model 1 in the table is 0.07. This means that the null hypothesis that parameters are jointly equal to zero is rejected at 10% significance level. This means that there is more than one variable in the model that explains the variation in NIIR, and this is a good feature of a model. The $R^2$ of the model is 0.30, which means that 30% of the variation in NIIR is explained by the explanatory variables in the model.

The results show that inflation rate is negatively and significantly associated with non-interest income and that the effect is felt with a lag of one year. That is, an increase in inflation rate reduces non-interest income in the following year. This result is consistent with a situation of unexpected inflation, Kiweu (2012), found similar results for Kenya during the period 2010 to 2011. As inflation rises, the operation expenses of the banks also rise, this causes banks to make adjustments to their business models to cover the increases in operation cost. Inflation also diminishes the banking's lending activity that means that intermediaries will lend less and allocate capital ineffectively. Therefore because of effects of inflation in the banking sector, commercial banks in Botswana have evolved their business models to tap into the non-intermediation sources of income to boost profitability and to ensure their financial stability in the competitive market, thus leading to a rise in non-interest income.

Similarly, lagged GDP growth rate, ATM installation and lagged equity asset ratio are inversely related to non-interest income. Although statistically insignificant, the coefficient on GDP growth rate has the right sign. We expect demand for quality credit to rise with an

increase in economic growth, which will in turn improve performance of that source of income and thus lessen the need to diversify to other sources. This result is also consistent with that of DeYoung and Rice (2004) and Hahm (2008). However, since the coefficient is statistically insignificant, it implies that economic growth is not an important determinant of non-interest income growth.

ATM development to population is found to be negatively and insignificantly related to non-interest income. Our prior expectation that ATM development positively influences non-interest income is not supported by the results of this study. However, the study confirms Shahzad (2012) findings that technological advancement tends to have a negative association with non-interest income. This outcome may be because of the high maintenance and investment costs of ATMs that are involved in the short and long run (Verboven and Degryse, 2009). Another reason for this negative association could be due to the modification in the technology sector as there has been advancement of internet and mobile banking. The advancement of internet and mobile banking therefore reduced the impact of ATMs in commercial banks in Botswana.

Contrary to prior expectations, there is a negative relationship between equity asset ratio and non-interest income ratio. However, this coefficient is statistically insignificant indicating that that when EQRAT goes up, banks will generate less non-interest income. Therefore, this is an indication that efficiency does not play a role in determining non-interest income in Botswana's commercial banks. However, some studies in income diversification such as Pennathur and Subrah (2012); Chiorazzo et al. (2008) and Busch and Kick (2009) have used this variable and have found that a higher ratio of equity to total assets indicates a high risk aversion and protection to bank default risk. Thus, banks will diversify to non-interest income.

The coefficient on bank size (BSIZE) is positive as expected, suggesting that large banks enjoy economies of scale because with more resources, they are able to invest in profitable investments to produce higher returns and also have better diversification prospects, unlike small banks whose daily operations are more elastic (Rozzani and Rahman, 2013). Therefore, diversification benefits from non-interest income improve with the size of the bank. However, the coefficient is statistically insignificant indicating that bank size is not an important determinant of non-interest income in Botswana's commercial banking sector. This

result could be because there is not much difference in the relative sizes of the banks in the sample.

Turning to model 2, the model captures the relationship between non-interest income and the financial performance of commercial banks. The results show that the probability value of the F-test in Table 5.7 is 0.02. This means that the null hypothesis that parameters are jointly equal to zero is rejected at 5% significance level. This means that there is more than one variable in the model that explains the variation in ROA, and this is a good feature of a model. The $R^2$ of the model is 0.66, which means that 66% of the variation in ROA is explained by the explanatory variables in the model.

The results show a negative and statistically significant relationship between non-interest income and bank's financial performance, as measured by the return on assets of commercial banks. These results are similar to those of Stiroh (2004) and Elsas et al. (2010). However, the findings of this study do not necessarily imply that commercial banks do not benefit from their diversification activities. Rather, this data represents a transition period on which banks are still in the infancy stage of learning how to best employ these ideas in order to reap the most benefits. These findings also emphasize that the attempt of commercial banks to venture into non-interest activities does not by any means replace their traditional interest income as the main source of revenue but only complements. Additionally, if it is not profitable to banks to shift non-intermediation sources of income, then this could be good for the nation as it would mean banks concentrate on their core business, which would improve resource allocation and hence economic growth.

The coefficient of loans to asset ratio (LOANRATIO) is positive and significant in association with return on assets. This variable captures the performance of the lending strategies of a commercial bank relative to its other earning assets. There is a significant relationship between an increase in the lending activity of commercial banks in Botswana and profits. The outcome is consistent with Stiroh and Rumble (2006) and Chiorazzo et al. (2008). Another important finding is that, the lagged return on assets is positively related to the financial performance of the bank. This implies that the past performance of the banking sector has a positive influence on the performance of the banks now.

In line with our priors, an increase in fees and commission on loans and advances is associated with a rise in return on assets. The same applies to deposit and transaction fees. Since Botswana's financial sector is bank-dependent, banks can increase their prices of offering services (e.g., fees and commissions), without significantly lowering the demand for those services. As a result, this will tend to increase their profitability, hence the positive relationship. According to Silber and Udell (1996), Fees and commission on loans and advances and deposit and transaction fees have become essential sources of revenue in modern times as commercial banks have shifted from traditional income to non-traditional sources of revenue, known as non-interest income.

The macroeconomic variable, inflation which is used as a control variable shows a positive and significant relationship in association with the financial performance of commercial banks in Botswana. The results are therefore consistent with the expectation of the study as they show a positive relationship between inflation and ROA. A positive relationship between inflation and bank performance implies that inflation brings about high profits to commercial banks. This is because customers were not able to forecast future inflation as compared to bank managers and hence profits were realized from asymmetric information. These results are similar those of Flamini et al. (2009) and Athanasoglou et al. (2005). They are however not in line with the finding of Ongore and Kusa (2013) who found a negative relationship between inflation and the bank profitability.

The other macroeconomic variable, GDP growth is positively and significantly related to the financial performance of commercial banks in Botswana. GDP growth affects the performance of banks. For example; when there is a decrease in GDP growth, the demand for credit decreases which in turn has a negative effect on the profitability of banks. On the contrary, in a growing economy, expressed by positive GDP growth, the demand for credit is high due to the nature of the business cycle. In a nut shell, the demand for credit is high during an economic boom as compared to economic recession (Athanasoglou et al., 2005). The business cycle theory postulates that during times of low economic downturn, firms are likely to suffer and ultimately fail. In relation to commercial banks, when there is an economic boom, the default risk of loan declines and there is more demand for both interest and non-interest assets. Bank of Botswana (2009) states that banks remained stable and profitable in the midst of the economic downturn, the profitability measures all declined in the year 2009 amidst the recession. The report states that the asset bases of the banks reduced

because banks reduced their investment with other banks to avoid the impact of the recession on their investments.

The study was set out to investigate the determinants of non-interest income in Botswana's commercial banks and its association with the financial performance. An empirical analysis is conducted to determine the impact of technological development, bank characteristics and macroeconomic factors on the non-interest income of commercial banks. The main findings are that GDP growth, inflation, ATM development and Equity asset ratio are negatively related to non-interest income. Bank size and one-period lag of ROA, on the other hand, are positively associated with non-interest income in Botswana's commercial banks. However, the coefficients on these variables are statistically insignificant, except in the case of inflation. The empirical results also indicate a negative relationship between non-interest income and financial performance of commercial banks in Botswana. Therefore, the empirically analysis clearly address the objectives of the study as most studies exactly explain what determines non-interest income and how its association with the financial performance of commercial banks.

# CHAPTER SIX

# CONCLUSION, POLICY RECOMMENDATIONS AND STUDY LIMITATIONS

## 6.0 Introduction

This chapter summarizes the study's main findings, draws conclusions and then offers policy recommendations. It comprises of four sections. Section 6.1 provides the summary of the study. The conclusion is stated in Section 6.2, which is followed by the policy recommendations in Section 6.3. Lastly, the limitations of the study and areas for future research are outlined in Section 6.4.

## 6.1 Summary

In recent years, there has been increasing importance of non-interest income in commercial banks of most economies. Despite the increasing reliance of commercial banks on non-interest income, there is, however, only a few academic writings that have looked specifically on the impact of the increasing presence of non-interest income on the financial performance of commercial banks in Botswana. Therefore, this study set as its main objective to investigate the factors that determine non-interest income and also the link of non-interest income to the financial performance of commercial banks. The study also deduces the policy implications. Chapter two provided an overview of non-interest income of commercial banks in Botswana. The study put emphasis on the structure and also the development of Botswana's financial sector. The sector has had some major improvement over the years. This includes increases in the number of commercial banks, introduction of new products, enhancement and increase in the quality of services offered by the banks. Some enhancements brought about an increase in the banking delivery channels like internet and mobile banking and automated teller machines (ATMs). There has been an advancement of internet banking which enabled services such as on-line account opening and payment of utilities.

The study investigates the determinants of non-interest income in Botswana's commercial banks and its association with the financial performance. It has empirically tested the

determinants of non-interest income in the commercial banks. The determinants tested include; bank characteristics, technological development and macro-economic conditions. A sample of three commercial banks namely; Barclays Bank Botswana, First National Bank Botswana (FNBB) and Standard Chartered Bank Botswana were used for the basis of this study for the period 2000 to 2014. These three banks were chosen considering the availability of data for the banks in the given study period and the fact they are the three largest commercial banks in Botswana in terms of market share. The study used an unbalanced panel of annual data for the commercial banks. The tests conducted include unit root tests, multicollinearity tests, autocorrelation test and the cointegration test.

This study followed the empirical model employed by DeYoung and Rice (2004). The study utilized the Portfolio theory by Markowitz (1952) which is relevant to a bank's portfolio choice decisions. The theory states that banks make a choice of whether to stick to their intermediation roles or diversify to other sources of income based on the expected returns of those choices. This theory is well explained in chapter three.

The estimated model consists of two equations. The first equation analyses the effect of technological development, bank characteristics, deregulation and macro-economic conditions on non-interest income performance. The second equation investigates the relationship between non-interest income and financial performance of commercial banks in Botswana. These two equations in the model are estimated as a system of equations employing the seemingly unrelated regression (SUR) estimation method.

### 6.2 Conclusion

This study analysed and established some determinants common to commercial banks in Botswana and other countries with more engagement in non-interest income activities.

Based on the results of the study, it is established that GDP growth, inflation, ATM development and Equity asset ratio are negatively related to non-interest income. Bank size and one-period lag of ROA, on the other hand are positively associated with non-interest income in Botswana's commercial banks. However, the coefficients on these variables are statistically insignificant, except in the case of inflation. This means that for the period under study only inflation rate influenced non-interest income performance. The relationship is

negative, suggesting that increase in inflation reduces the share of non-interest income in total bank income.

There was evidence of a negative and insignificant relationship between GDP growth and non-interest income in Botswana in 2000 to 2014. GDP growth seems not to be an important factor in increasing non-interest income in the commercial banks of Botswana, and that might be the reason why the variable is insignificant.

The other major finding is that in Botswana, between the period of 2000 to 2014, inflation has shown to be negatively and significantly related to non-interest income. These results imply that for this period, as inflation increased, the operation expenses of the banks also increased, this caused banks to make adjustments to their business models to cover the increases in operation cost. Therefore because of effects of inflation in the banking sector, commercial banks in Botswana have evolved their business models to tap into the non-intermediation sources of income to boost profitability and to ensure their financial stability in the competitive market, thus leading to a rise in non-interest income.

ATM development to population is found to be negatively and insignificantly related to non-interest income. The negative association may be because of the high maintenance and investment costs of ATMs that are involved in the short and long run. Another reason for this negative association may be due to the modification in the technology sector as there has been an advancement of internet and mobile banking. The advancement of internet and mobile banking therefore reduced the impact of ATMs in commercial banks in Botswana.

This study also shows that equity asset ratio is a negative, but insignificant determinant of non-interest income. Commercial banks in Botswana have a lower ratio of equity to total assets indicating a low risk aversion and protection to bank default risk. Thus, banks will generate less non-interest income. Another finding is that, Bank size (BSIZE) is found to be positively and insignificantly related to non-interest income. These results imply that, diversification benefits from non-interest income improve with the size of the bank. In Botswana, the large banks are the ones with a great proportion of market share and more non-interest revenue activities than small banks supporting the economies of scale theory.

The empirical results show a negative and significant relationship between non-interest income and bank's financial performance in Botswana. This outcome implies that the attempt of commercial banks to venture into non-interest activities does not in any means replace their traditional interest income as the main source of revenue but only complements. Hence the financial performance of banks still solidly depends on the interest income activities.

Another important conclusion from this study is that, the loans to asset ratio are an important determinant of commercial bank performance. This variable is positively related to the lending activity of commercial banks in Botswana and profits. The study found that, an increase in fees and commission on loans and advances will lead to a rise in return on assets. The same applies to deposit and transaction fees; this variable has a positive association with return on assets. Fees and commission on loans and advances and deposit and transaction fees have become an essential sources of revenue in modern times as commercial banks have shifted from traditional income to non-traditional sources of revenue.

Inflation is also found to favour Botswana's commercial banks. This is shown by the positive and significant relationship in association with the financial performance of the banks. This is because customers were not able to forecast future inflation as effective as bank managers do. The other important finding is that in Botswana during 2000 to 2014, GDP growth had positively and significantly association with the performance of commercial banks. This shows that commercial banks in Botswana can remain sound and profitable in the midst of the economic shocks.

### 6.3 Policy Recommendations

One of the specific objectives of this study was to come up with policy implications and recommendations regarding the determinants of non-interest income in commercial banks in Botswana. Therefore, based on the study's conclusion, there are some issues that policy makers and bank managers need to consider.

Since the study results indicate that loans to assets ratio affect bank performance positively while non-interest income affects it negatively, banks are advised to concentrate on intermediation activity to remain profitable. Improved intermediation would help economic growth, which would in turn improve bank profitability.

The study finds a negative and significant relationship between non-interest income and financial performance of commercial banks in Botswana. Banks are advised to understand how they can maximise from income diversification thus providing a pivotal basis for successful risk management decisions and a further study into this later on could rectify the divergent results and give constructive explanations.

The study has established a positive influence of bank size to non-interest income. Large banks are the ones with more non-interest income activities compared to the small banks. The relevant authorities should come up with policies to protect small banks from being suffocated by the large banks. This will encourage competition and financial inclusion in the economy. Therefore, it is important for small commercial banks to increase their size and thus establish a policy that would help them in product diversification. The government should also put in place a policy on diversification, as diversification leads to a development of bank activities into a variety of investment ventures and this can be achieved through investing in financial markets. The diversification policy is important as it encourages commercial banks to employ activities that generate non-interest income since non-interest income positively impacts the performance of banks.

Since the results of the study showed that commercial banks in Botswana have a lower ratio of equity to total assets. Commercial banks are advised to increase their equity asset ratio through issuing more shares to existing shareholders and the public. The increment of equity will also encourage product diversification as banks will be able to invest in different investment ventures and reduce their dependence on interest income activities.

Estimation results revealed that there is a negative and insignificant association between ATM development to population and non-interest income. Therefore, the government is advised to introduce a new policy of low cost advanced technologies that will complement the development of ATMs in the banking sector. For instance, the policy that stimulates the advancement of internet and mobile banking will lead to an increase in productivity that would assist banks to invest in non-interest income ventures.

Inflation is negatively and significantly associated with non-interest income. Inflation reduces credit expansion and hence curbs the intermediation role of banks. Therefore, in order to encourage intermediation, inflation ought to be controlled. The government can employ the

direct intervention price policy in order to regulate inflation by monitoring the market lending price. This will encourage banks to diversify their operations and focus more on generating revenue through other sources other than the traditional interest income. Diversification will therefore lead to an increase in non-interest income in commercial banks.

The study also established a negative and insignificant relationship between GDP growth and non-interest income in Botswana. Monetary and fiscal policies should, therefore be used by policy makers to ensure economic stability. This will prevent unbalanced growth rates and a high inflation rate which causes an increase in volatility in non-interest income.

### 6.4 Limitations of the study and Areas for Further Research

The study used annual panel data for the period 2000 to 2014 for the three commercial banks in Botswana (FNBB, Barclays Bank and Standard Chartered). This series of data was too short to establish clearly the long run and the short run dynamics. Therefore, there is a need to analyse determinants using a long series and also investigate the changes in estimated parameters. Another limitation experienced was that Botswana faces a problem of documented data. Some commercial banks were unwilling to provide their data and for some banks data from earlier years was not available. This unavailability led to a small sample size which had adverse effects on the types of estimations to be employed. Some of the studies reviewed of other countries show additional determinants beyond the scope of variables that were not part of this study. These include exchange rate, level of investment, market concentration and stock market risk. Therefore, there is a need for future studies to find out how these additional determinants affect non-interest income of commercial banks. Finally, there is also need for future research to conduct a similar analysis on micro-finance institutions to compare and contrast the study findings.

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